Ontario

Ontario's Anti-Smog Action Plan

Progress Through Partnership

Progress Report
August 2000

Minister's Introductory Letter - Partners in Progress: ASAP Progress Report.

Cleaner air is everybody's business. As individuals, organizations, industries and governments, we must all work together for a healthy environment.

Ontario's commitment to reduction of ozone levels and emissions of ozone-forming chemicals is well known. We have set up a multi-sectoral partnership and developed the Anti-Smog Action Plan (ASAP) to reduce emissions of nitrogen oxides (NOx) and volatile organic compounds (VOCs) in Ontario by 45 percent of 1990 levels by 2015 and to develop an Ontario strategy to reduce emissions contributing to fine particulate matter.

Ontario's Anti-Smog Action Plan brings together a unique partnership involving industry associations, companies, government agencies and non-government organizations. Several industries are undertaking aggressive programs to reduce their NOx, VOCs, sulphur dioxide (SO2), and particulate matter emissions. Others are working hard to better understand their emissions and the opportunities that are available for reductions, in order to develop reduction programs.

More than 50 organizations representing individual companies, industrial associations, and governments have now signed Ontario's Anti-Smog Accord – proof positive of the broad level of support that's out there for our goals. We have all invested a lot of hard work into designing and implementing the plan.

There's no doubt that we have made significant progress toward reducing the emissions that lead to smog. For example, we have learned a great deal more about particulate matter in Ontario over the last couple of years. This is a product of the work of the Anti-Smog Action Plan partners and work we've done with the federal and other provincial governments in developing Canada-Wide Standards for ozone and particulate matter.

As important as it is to reduce Ontario's smog-related emissions, we must remember that at least half of Ontario's smog problem is attributed to U.S. sources. That is why I strongly endorse the action of the federal government to negotiate and secure significant reductions from the upwind jurisdictions.

Much of the credit for progress to date goes to those who have signed the Anti-Smog Accord, the ASAP Operating Committee members and the working group participants who have determined baseline emissions inventory information and have designed and implemented unique quick-start actions and long-term reduction strategies.

In view of the significant effects associated with smog, I will now be challenging the partnership to reduce emissions more quickly – by 2010. This is, however, contingent upon the federal government negotiating similar reductions from the U.S. in the talks scheduled this fall.

There are tremendous opportunities – in terms of technologies available, in terms of the willingness of industries throughout the province to take up the fight, and in terms of the significant progress that is possible without compromising the quality of life we currently enjoy. In 2000, our focus is on identifying, planning and implementing further integrated reduction measures and actions. Good progress has been made and great momentum has been built up; however, still more work must be done. I am confident that, by working together we will meet our target.

I congratulate the entire ASAP team on their efforts to date and I invite all Ontarians to join us in the fight for cleaner air.

Sincerely,

The Honourable Dan Newman
Minister

Executive summary
Cleaner air is everybody's business

On March 1, 1999, Ontario's Anti-Smog Action Plan Secretariat forwarded a questionnaire to the Anti-Smog Accord signatories and members of the Anti-Smog Action Plan Operating Committee and work groups, requesting information on recent activities relating to reductions in emissions of smog precursor compounds and particulate matter into air.

This Anti-Smog Action Plan Progress Report summarizes the results from the questionnaire and describes additional activities since the Plan was released in January, 1998. It profiles Ontario industry sectors and companies and government and non-government agencies that have reported on reductions or activities related to reductions in the release of smog-producing nitrogen oxides (NOx) and volatile organic compounds (VOCs).

Progress has been demonstrated through the exchange of information and ideas for best management practices and techniques, and installation and application of these practices by certain ASAP partners and Anti-Smog Accord signatories. This report describes reductions in NOx, VOCs and particulate matter (PM) occuring in Ontario.

As of March 31, 1999, 33 work groups reported progress: 18 groups confirmed 1990 sector baseline emissions; 22 identified "quick start" actions to achieve reductions in the short term; 12 developed plans for additional reductions; nine reported measured reductions and three are developing new reduction plans. All work groups developed customized approaches to smog reduction.

The report also outlines the recommendation made to the government and the Operating Committee by an independent scientific panel on how to build Ontario's knowledge, science and technologies toward a better understanding and effective reduction of smog precursors and particulate matter.

The report highlights meaningful progress; however, it is not a comprehensive summation of all sector activities at time of publication.

Acknowledgments

The Ministry of the Environment and the Anti-Smog Action Plan Operating Committee would like to extend their sincere appreciation for the efforts and dedication of the work group co-chairs and participants in the preparation of sector and industry commitments and emission reduction and strategic plans in the last several years. This gratitude is also extended to those individuals working with the Ontario government for the purpose of evolving the policies and strict mandates to effect the reduction of smog.

In addition, those Anti-Smog Accord signatories developing or implementing quick starts, reporting emission reductions or participating in other anti-smog action plans should also be recognized and commended for their work.

The Centre for Research in Earth and Space Technology (CRESTech) and Network for Environmental Risk Assessment and Management (NERAM) are also acknowledged for their preparation of the Scoping Study: *Information Gaps and Uncertainties in the IP/RP Compendium Document and their Impact on Strategic Options*. This work will enable us to better understand the scientific, engineering and economic aspects central to the complex issue of environmental particulate matter. To this end, all Scoping Study participants are to be commended for their commitment to this very important work.

For further information regarding the Plan or to submit emission reduction information as outlined in the Appendix, please contact:

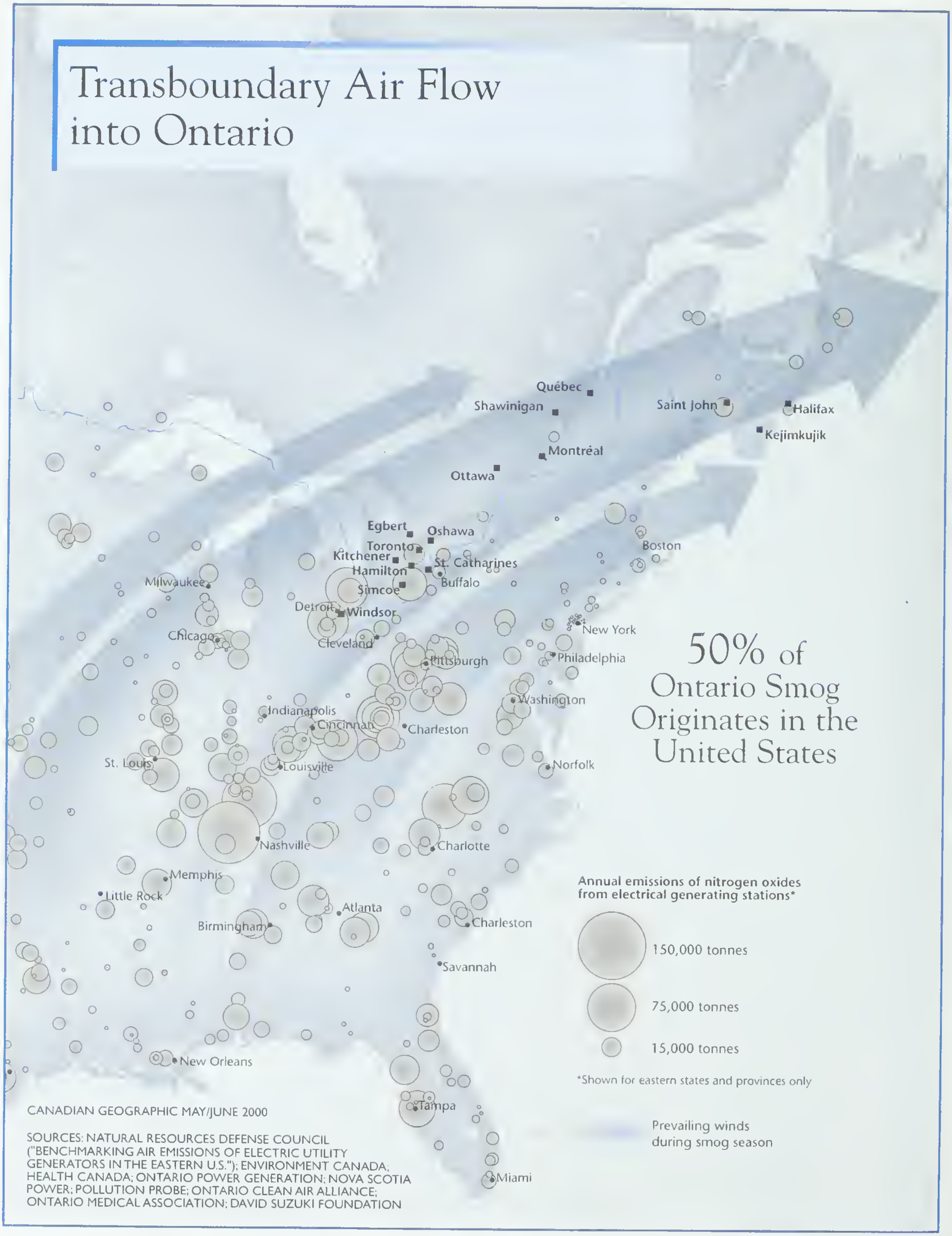
The Secretariat
Anti-Smog Action Plan Operating Committee
c/o Ontario Ministry of the Environment
Air Policy and Climate Change Branch
135 St. Clair Avenue West, 4th Floor
Toronto ON M4V 1P5
Telephone (416) 314-7878
Fax (416) 314-4128

Table of contents

Executive summary ii
1. Introduction 1
2. Progress and activities, 1998-1999 5
  2.1 Progress highlights 6
  2.2 New partners join the Anti-Smog Action Plan 7
3. Toward reduction of particulate matter 9
  3.1 Compendium of current knowledge on fine particulates 10
  3.2 Strategy meetings on development of fine particulate matter standards 12
  3.3 Building Ontario's knowledge, science and technology 13
  3.4 Residential Wood Burning Working Group 14
4. Public awareness and engagement 15
  4.1 Municipal Guide and Smog Alerts 16
5. Sector progress: Smog precursor reductions and related activities 17
  5.1 Transportation sector 17
    5.1.1 Drive Clean. 17
    5.1.2 Cleaner vehicles. 18
    5.1.3 Cleaner fuels. 19
    5.1.4 Clean Marine Partnership. 19
  5.2 Industry and Manufacturing Sector 20
    5.2.1 NOx Emissions Work Group 20
  5.3 NOx and VOC Emissions Work Groups 21
    5.3.1 Iron and steel sector. 21
    5.3.2 Petroleum refining sector. 22
    5.3.3 Chemicals sector. 23
  5.4 Surface Coating Emissions Work Groups 24
    5.4.1 Surface Coating Automotive Manufacturing. 24
    5.4.2 Surface Coating Automotive Refinishing. 25
    5.4.3 Surface Coating Automotive Parts. 25
    5.4.4 Wood Products. 25
    5.4.5 General Metal Finishing. 26
    5.4.6 Consumer Coatings. 26
    5.4.7 Can Coatings. 26

5.5 General Solvent Use Emissions Work Groups 27
  5.5.1 Commercial and Industrial Printing. 27
  5.5.2 Plastic Processing Work Group. 27
  5.5.3 Asphalt cutback and emulsion sector. 28
5.6 Consumer Products Work Group 28
6. Energy, electricity restructuring and environmental protection 29
6.1 Ontario Hydro commitment (1991), carried on by Ontario Power Generation. 29
6.2 Gas combustion turbines 30
6.3 Boilers and heaters 31
  6.3.1 CCME National Emissions Guideline for Commercial and Industrial Boilers and Heaters. 31
6.4 Natural Gas 32
6.5 Emission reduction trading 32
7. U.S.-Ontario transboundary smog reduction initiatives 34
8. Monitoring performance and measuring progress 36
9. Anti-Smog Action Plan progress summary 37
10. Literature cited 40
11. Glossary of abbreviations 42
Appendix 1: Anti-Smog Action Plan Questionnaire 45
Appendix 2: Summary of Ontario's Anti-Smog Action Plan Progress: Identified Potential NOx and VOC Reductions as of March 1999 53
Appendix 3: Anti-Smog Accord Signatories, January 2000 54

Transboundary Air Flow into Ontario



50% of Ontario Smog Originates in the United States

CANADIAN GEOGRAPHIC MAY/JUNE 2000

SOURCES: NATURAL RESOURCES DEFENSE COUNCIL ("BENCHMARKING AIR EMISSIONS OF ELECTRIC UTILITY GENERATORS IN THE EASTERN U.S."); ENVIRONMENT CANADA; HEALTH CANADA; ONTARIO POWER GENERATION; NOVA SCOTIA POWER; POLLUTION PROBE; ONTARIO CLEAN AIR ALLIANCE; ONTARIO MEDICAL ASSOCIATION; DAVID SUZUKI FOUNDATION

1.0 Introduction

The purpose of this report is to provide an update on actions that have been taken to reduce smog, which in turn will lessen its harmful effects on human health and the environment. It documents activities between January, 1998, when what was then known as Ontario's Smog Plan was first released, and March, 1999. It also highlights some of the significant activities between 1996 and 1998 as the Plan was being developed. (In late 1999 the Plan was renamed the Anti-Smog Action Plan [ASAP], and the Steering Committee is now the Operating Committee.)

What is smog?

Smog is formed when nitrogen oxides (NOx) and volatile organic compounds (VOCs) react together in the presence of sunlight to form ground-level ozone. Smog is a mixture of ground-level ozone and microscopic airborne particulate mater (PM) known as inhalable and respirable particles (IP/RP).

In Ontario, the largest sources of smog-causing emissions are cars, trucks and buses. Various industrial activities, including power generation and heating combustion, also make significant contributions to smog.

Sources in the United States account for more than half of Ontario's smog problem.

Air pollution and smog aggravate a wide range of health and environmental problems. Health problems include asthma, bronchitis and cardiac illness. Other health effects include breathing problems, increased hospital admissions and restricted activity on heavy smog days.

Smog is also linked to other environmental issues such as acid rain, air pollution and climate change. Significant ozone concentrations may also damage exposed vegetation, including agricultural crops, forest vegetation and other plant communities.

Taking action – the Anti-Smog Action Plan

In 1990, the Canadian Council of Ministers of the Environment (CCME) released its Phase I NOx and VOC Management Plan. The CCME's plan identified regions in Canada which suffer from smog, and the Windsor-Quebec corridor was recognized as one of the worst smog regions in the country.

In 1994, the federal environment and energy ministers called for a "next steps" NOx/VOC strategy as a follow-up to the 1990 CCME plan. In 1995, the Ontario Ministry of the Environment initiated the development of a collaborative planning process to take action on smog. First, the ministry assembled baseline emissions data for 1990 from all known sources of smog-causing pollutants. Then, NOx and VOC emissions were projected to the year 2015 to enable stakeholders and the public to determine what action could and should be taken to address the smog problem.

In June 1996, the ministry released *Towards a Smog Plan for Ontario* and proposed emission reduction targets for discussion at a stakeholder workshop. Subsequently, the multi-stakeholder Smog Plan Steering Committee and sector/sub-sector work groups were formed to develop and implement a smog reduction process.

As a step toward addressing fine particulates in smog, the minister announced in November, 1997, an interim ambient air quality criterion for inhalable particles of 50 micrograms per cubic metre of air, expressed as a 24-hour average. This served as the benchmark for the development of the Canada-wide standard for particulate matter.

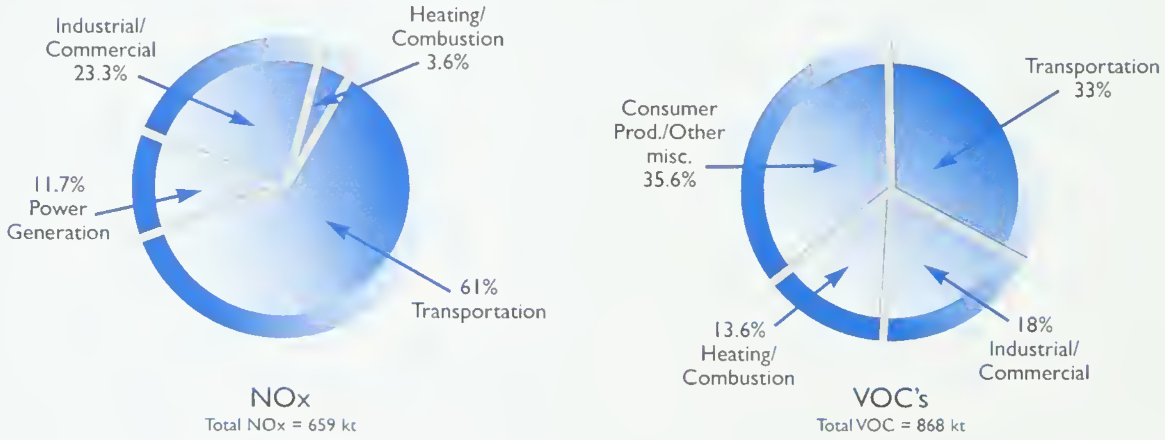
By January, 1998, *Ontario's Smog Plan: A Partnership for Collective Action* was published by the Steering Committee, representing, in the initial phase, the work of hundreds of partners and organizations. The centrepiece of the Plan was *Ontario's Smog Accord*, which outlined the intent of 44 signatories to work toward specific emission reduction targets. Supporting the Smog Accord and Plan was *Ontario's Smog Plan: Draft 1997 Work Group Reports Compendium Document*, a document comprising work group plans and reports detailing their status.

The process for the Plan includes a number of "engagement" steps. For example, partners' involvement includes:

- indicating "in principle" participation by signing the Smog Accord, Letter of Intent, Letter of Cooperation or Memorandum of Understanding;
- confirmation of their 1990 baseline for NOx and VOC emissions;
- identifying "quick start" actions that could be implemented in the near term;
- developing reduction plans and determining reductions that could be achieved over five-year cycles (2000, 2005, 2010 and 2015); and,
- implementation, monitoring and reporting on emissions reductions.

Three types of partners associate with the Anti-Smog Action Plan. The first are partners who were already engaged in the CCME process for NOx and VOC (the MOE would accept and include the reductions/commitments made through that process). The second type are partners who have developed a plan and are just embarking on quick starts and/or reductions. And the third type are "new entry partners" who are just beginning to plan. ASAP commits to report annually on the progress of the plan partners, signatories and work groups. The Operating Committee and the Ontario government will review this progress and build on existing and planned efforts by smog partners to reduce emissions.

Smog Plan - 1990 NOx and VOC Emissions in Ontario



* from Ontario's Smog Plan - A Partnership for Collective Action, Steering Committee Report, January 1998

Ontario's smog reduction target

The Anti-Smog Action Plan sets an air quality target – to achieve, by 2015, a 75 per cent reduction in the number of times a year ozone readings exceed the ambient air quality criterion (AAQC) of 80 parts per billion. (The starting point for the reduction target is the average number of exceedences in the years 1990 to 1994.)

The Plan tabled Ontario's 1990 baseline emissions of 659 kilotonnes of NOx and 868 kT of VOCs from all known sectors. For the air quality target to be met, the ministry estimated that an emissions reduction of 45 per cent from the 1990 baseline would be necessary by 2015. The Plan recognizes that inhalable and respirable particulates are a key component of smog. Little was known about the sources and the quantities of particulates emitted, but to assist in benchmarking reductions, the ministry established an interim target of a 10 per cent reduction, with the full recognition that a comprehensive understanding of source apportionment (both domestically and internationally) would need to be achieved before effective reduction strategies could be developed.

ASAP also features a mix of regulation, policy and voluntary action – an approach that is considered to be the most effective for reducing smog-related emissions, while ensuring a level playing field.

Progress through partnership and collaborative action

The Anti-Smog Action Plan is a 20-year plan and action agenda focusing on emission reductions for ozone precursors (NOx and VOCs) and reductions of emissions contributing to particulate matter (sulphur dioxide, NOx, VOCs and particles). Key components of the Plan include:

- Ontario's Smog Accord – symbolizing the commitment of more than 50 signatory associations to cleaner air;
- a commitment of signatories to a target of a 75 per cent reduction by 2015 in the number of times the one-hour ozone criterion of 80 parts per billion is exceeded;
- a 45 per cent reduction in total NOx and VOC emissions from the 1990 Ontario baseline;
- a commitment to develop a particulate matter strategy for Ontario;
- "quick start" actions to achieve immediate short-term reductions for identified initiatives;
- development of longer-term emission reduction plans and updating long-term plans on a five-year cycle; and,
- implementation of a disciplined management process and organizational structure.

More than 130 organizations participated in the development of ASAP. Many of these were associations or umbrella groups, representing a much larger cross-section of member companies, agencies and organizations.

"The Alliance of Manufacturers & Exporters Canada supports the participation of all relevant stakeholders to develop cost-effective anti-smog actions that produce measurable air quality improvements in Ontario. The Alliance believes that the Anti-Smog Action Plan is an excellent example of what can be achieved when stakeholders work collaboratively."

Ian Howcroft
Vice President, Ontario Division
Alliance of Manufacturers & Exporters Canada

As of March 31, 1999, 33 work groups reported progress:

- 18 work groups confirmed their 1990 baseline emissions;
- 22 identified "quick start" actions to achieve reductions in the short term;
- 12 developed plans for additional reductions;
- nine reported measured reductions;
- three have developed new reduction plans; and,
- all work groups developed customized approaches to smog reduction.

Anti-Smog Action Plan Reductions Identified, Planned or Implemented March 1999					
Baseline NOx Emissions (1990)	45% Target (2015)	NOx Reduction Amount Identified, Planned or Implemented kilotonnes (kt)	Baseline VOC Emissions (1990)	45% Target (2015)	VOC Reduction Amount Identified, Planned or Implemented kilotonnes (kt)
659 kt	296 kt	217 - 242 kt	868 kt	390 kt	202 -228 kt

A key goal of the Ontario Anti-Smog Action Plan is to reduce both nitrogen oxides and volatile organic compounds emissions by 45 per cent from their 1990 level. The actual required emission reductions might be greater since emissions by 2015 have been projected to increase due to economic growth (*Towards a Smog Plan for Ontario, June 1996*). It is also anticipated that the development of new industrial and environmental technologies might cause a significant decrease in emissions from certain industrial processes. Ontario's commitment is to cap NOx/VOC emissions 45 per cent below the 1990 levels by 2015. For additional information on forecasted growth with estimated reductions see *Proposed Performance Indicators for Ontario's Anti-Smog Action Plan*. As of March 31, 1999, identified, planned or implemented reduction opportunities toward the 45 per cent reduction target for 2015 are expected to achieve up to approximately 80 per cent of the targeted reductions for NOx and 60 percent of the targeted reductions for VOCs. Appendix 2 of this report, *Summary of Ontario's Anti-Smog Action Plan Progress Report: NOx and VOC Reduction Commitments as of March 1999*, reviews the quantified progress reported from Ontario sectors and associations.

> *"We have worked side by side with Ontario's Ministry of the Environment for more than six years in an effort to bring the Province and its constituents cleaner air. This co-operative association is a model for how a government-industry working relationship should operate. The Anti-Smog Accord and ASAP process allows us to continue this association and to further our participation in the efforts and achievements made to date towards combating smog."*
>
> Steve Quinn
> President
> Protect Air Inc.

2.0 Progress and activities: 1998-1999

Toward a healthier environment through prevention and protection

A two-level strategy, prevention and protection, was the focus of the ASAP partners' activities in 1998-1999. Building on the foundation provided in the Plan, the partners continued to develop activities, plans and initiatives to improve the environment in Ontario and address the health challenges associated with smog.

This report is organized around the partners' progress and activities relating to five key thrusts of the Anti-Smog Action Plan:

- develop a particulate emissions reduction strategy;
- engage the public, business and government in smog reduction actions;
- achieve emission reductions (for the industrial, transportation and public sectors) and set sectoral targets for emission reductions for NOx, VOCs and particulates;
- reduce transboundary pollution; and,
- monitor performance and measure progress through implementation of a disciplined management policy.

> *"Member companies of the Canadian Vehicle Manufacturers' Association have a successful record of significant environmental achievement through defined voluntary action, over and above regulation. The Ontario government Anti-Smog Action Plan provides a valuable partnership mechanism for the automotive industry to carry out its smog reducing initiatives effectively and efficiently while working towards the mutual goal of significant air quality improvement in this province."*
>
> Mark Nantais
> President
> Canadian Vehicle Manufacturers' Association

Progress highlights: 1998 -1999

A comprehensive combination of ***scientific research, policy and legislative initiatives, voluntary action, reduction measures and disciplined management*** provided the foundation for the past year's smog prevention and protection efforts.

Action on particulates:

Ontario leads the country in the development of a ***fine particulate strategy*** – provincial expertise in inhalable and respirable particles has been extensively utilized for participation in the development of Canada-Wide Standards for ozone and particulates. Expertise has been made available for independent scientific reviews on how to build ***Ontario's knowledge, science, and technologies*** toward reduction of smog precursors and particulate matter.

Community engagement:

Awareness and engagement of all sectors, with particular focus on the general public, has been a central point of activity in this past year. Through Ontario's ***Drive Clean*** Program and a system of ***Smog Alerts***, a social marketing campaign has developed that focuses on strategies for lifestyle change, community engagement and public health awareness. ***Smog Alerts, A Municipal Response Guide, 1999***, was prepared by the Ministry of the Environment to provide guidance to the municipalities for the purpose of establishing local smog policies and recommendations for action during a smog alert.

Emission reductions:

Initial planning efforts identified area and point source emission reductions of approximately **50 per cent for NOx/VOCs**. The transportation and industrial/manufacturing sectors are stepping up efforts in this area. Work groups established in 1996-1998 are continuing their efforts; new ones have formed and additional partners have signed the Smog Accord – underscoring the commitment of hundreds more businesses and thousands of their employees to reduce smog.

Transboundary initiatives:

Ontario was granted intervener status in the U.S. Court of Appeals to support the U.S. Environmental Protection Agency in its defence against a challenge to the EPA's State Implementation Plans (SIP) Call for NOx. The SIP Call (Sept. 24,1998) set caps for states to limit their NOx emissions and required 22 states and the District of Columbia to submit SIPs by Sept. 30, 1999. The rule requires that emission reduction measures be in place by May 1, 2003, and that caps be met by 2007. This rule would reduce emissions in the United States and reduce transboundary pollution into Ontario. Eight states launched a legal challenge to the validity of the EPA's NOx SIP Call. There are now more than 100 potential litigants. Ontario filed its brief on July 16, 1999, in support of the EPA. In March 2000, the U.S. Court of Appeals ruled in favour of the EPA.

Disciplined management:

A key element of the Plan, the **disciplined management policy**, has been further developed and is now in the implementation phase. The policy features a framework for performance monitoring and reporting, as well as 10 progress indicators which can be used to objectively, fairly and scientifically measure and report on actual reductions achieved.

New partners join the Anti-Smog Action Plan
1998-1999

We, the undersigned, will agree to work in support of Ontario's Anti-Smog Accord

Mr. Terry Cooke
Regional Chairman
Regional Municipality of
Hamilton-Wentworth

Daniel A. Willis

Daniel A. Willis
Environmental Director
Blue Circle Cement

Mr. John Lee
Vice-President, Metal Group
ChemCraft International Ltd.

Alex Keen.

Mr. Alex Keen
President
The Altech Group

Mr. Steve Quinn
President
ProtectAir Inc.

Mr. Robert Telewiak
Vice-President, Environment
Falconbridge Ltd.

FRShammas

Faris Shammas
Executive Director
Canadian Plastics Industry Association

Highlights of Progress: ASAP Reductions Identified, Planned or Implemented

Sector or Work Group	Work Group Formed	1990 Baseline Determined	Quick Starts Identified	Quick Starts Implemented	Reductions Reported
Transportation					
Clean Vehicles	🟦✓	🟦✓	🟦✓	✓	
Clean Fuels	🟦✓	🟦✓	🟦✓	✓	✓
Clean Marine	🟦✓	✓			
Off-Road Vehicles	🟦✓	🟦✓	🟦✓		
Demand Management	🟦✓	Not applicable	🟦✓		
Industry / Manufacturing					
NOx Emissions	🟦✓	🟦✓	🟦✓	✓	✓
Iron and Steel Production	🟦✓	🟦✓	🟦✓	✓	✓
Petroleum Refining	🟦✓	🟦✓	🟦✓	✓	✓
Chemical Manufacturing	🟦✓	🟦✓	🟦✓	✓	✓
Automotive Manufacturing	🟦✓	🟦✓	🟦✓	🟦✓	✓
Automotive Refinishing	🟦✓	🟦✓	🟦✓	✓	✓
Automotive Parts	🟦✓	🟦✓			
Wood Products	🟦✓	🟦✓			
Consumer Coatings	🟦✓	🟦✓	🟦✓	✓	✓
Arch./Main Coatings	✓	✓			
Cans/Metal Packaging	🟦✓		✓	✓	✓
Heavy Equip. Coating	🟦✓				
Printing & Graphics	🟦✓		🟦✓		
Adhesive & Sealants	🟦✓		🟦✓		
Plastics Processing	🟦✓	✓	🟦✓	✓	✓
Consumer Products	🟦✓				
Asphalt Cutback	✓	✓	✓	✓	✓
Resident. Wood Combustion	✓		✓	✓	
Government Leadership	🟦✓	✓	✓	✓	✓
Transboundary	🟦✓	✓	✓	✓	
Public Acceptance	🟦✓	Not applicable	🟦✓	✓	Not applicable
PM & Ozone OAWG	🟦✓	Not applicable	✓	✓	
Monitoring & Reporting	✓	Not applicable	✓	Not applicable	Not applicable

Legend:		
🟦✓ indicates commitments reported in 1997 Smog Plan Work Group Report	✓ indicates progress reported after 1997	indicates no progress on activity listed above

3.0 Toward reduction of particulate matter

Only in the past few years have scientists demonstrated that there is a significant relationship between airborne fine particulate matter and cardiopulmonary health. A significant commitment was made in the 1998 Smog Plan and through the Operating Committee's Particulate Matter and Ozone Options Assessment Working Group (OAWG) to develop a strategy for the reduction of inhalable and respirable particulates. To enable this, the work group's membership and mandate were expanded to include:

- identification and assessment of strategic options to reduce particulate matter emissions in Ontario;
- recommendations on the form, level of attainment and final date of provincial ambient air quality criteria for particles of 2.5 and 10 microns ($PM_{2.5}$ and PM_{10}) and identification of reduction measures to achieve these criteria; and,
- identification and evaluation of criteria for ground-level ozone air quality targets.

The 1998 Smog Plan said ...

The work group is developing a strategy that considers emission reduction targets, emission inventories, standards development, air monitoring, computer modeling, cost-benefit analysis, control technologies, implementation methods and communications. This strategy will complement efforts at a national level and will be completed by 1998 for review by the Steering Committee.

In 1998, seven strategic options and a number of multilateral quick start actions were identified. Two draft documents were prepared by the ministry for use by stakeholders in the development of a PM strategy for Ontario:

- *A Compendium of Current Knowledge on Fine Particulate Matter in Ontario*; and,
- *Strategic Options to Address the Fine Particulate Issue in Ontario*.

Canada-Wide Standards for ozone and particulate matter

The development of Canada Wide Standards for PM/ozone is being championed by Environment Canada. A Development Committee has been struck with representatives from the federal and provincial/territorial governments. Since recommendations for PM/ozone CWSs to the Canadian Council of Ministers of the Environment were expected in the fall of 1999, a great deal of effort was made to advance the issue. A national workshop held in October 1998 and a second workshop held in May 1999 provided input to the recommendations of the Development Committee for the ministers in the summer. As background information, the Federal-Provincial Working Group on Air Quality Objectives and Guidelines has prepared Science Assessment Documents on PM (published in late 1997) and on ozone (published in March 1999).

In December 1998, the work group presented its Strategic Options and Background report to the Steering Committee (since renamed the Operating Committee). The work group adopted the following approach:

- to work collaboratively to address the issue of inhalable and respirable particles (IP/RP);
- to consider developments associated with the Canada-Wide Standards and U.S. research/policy processes;
- to develop scientific and technical knowledge on IP/RP and policy options for Ontario, and address gaps and uncertainties (e.g. emissions inventories, cause of health impacts, atmospheric chemistry, cost-benefit analysis); and,
- to integrate with and/or consider other environmental issues (e.g., acid rain, climate change, indoor air quality).

3.1 Compendium of Current Knowledge on Fine Particulate Matter

Our knowledge has increased significantly, but there are still gaps. The compendium document – *A Compendium of Current Knowledge on Fine Particulate Matter in Ontario* – provides a basis for understanding the origins and precursors of IP/RP, and demonstrates significant progress through the inclusion of emission estimates from all sources. In the area of health impacts, the document recognizes that the interpretation of health studies is still subject to debate (particularly concerning the role played by co-pollutants found in the atmosphere), but confirms that the evidence linking IP/RP to health effects is ***"strong enough to warrant action".***

While significant progress has been made, a number of key gaps need to be filled. Ontario's strategy will need to consider the benefit/cost relationship of reducing particulate. In addition, more ambient air monitoring, source characterization, and assessment will be required. Further IP/RP related research is needed in several areas, including: determining the relative impacts of PM_{10} and $PM_{2.5}$; emission inventories; development of modelling capability; and the use of economic instruments.

The Particulate Matter Ozone Options Assessment Working Group has examined the regulatory, policy and strategic management framework available in Ontario. While the work group's Strategic Options identify the potential for new standards, mechanisms are already available to ensure that emissions of fine particles and smog precursors are reduced through the existing policy and regulatory frameworks.

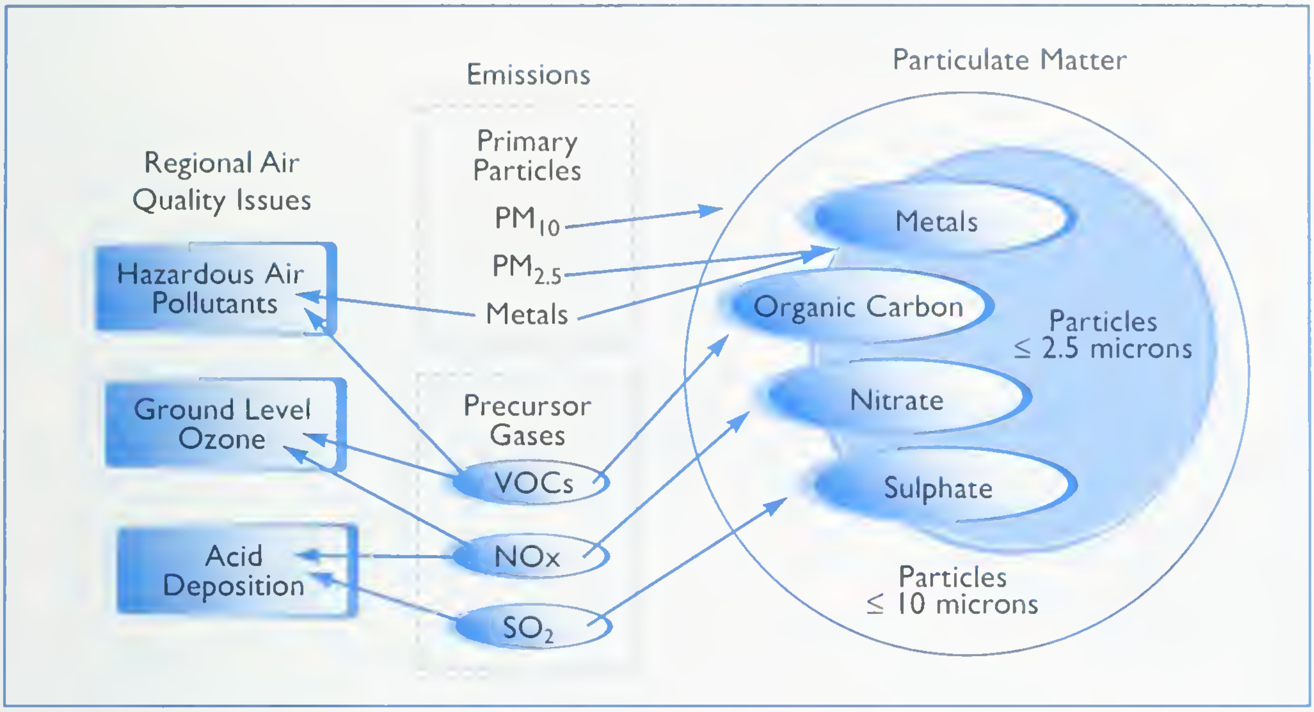
This framework comprises a comprehensive index of tools including:

- 23 "real-time" (continuous read-out of data) monitors for fine particulates (12 for PM_{10} and 11 for $PM_{2.5}$) and 23 24-hour monitors for PM_{10} (the latter also providing data on heavy metal and sulphate content), installed by the Ontario Ministry of the Environment;
- Air Quality Regulations: Gasoline Volatility Regulation (O. Reg. 271/91); Air Contaminants from Ferrous Foundries (O. Reg. 339/90); Sulphur Content of Fuels (O. Reg. 361); Recovery of Gasoline Vapour in Bulk Transfer (O. Reg. 345/94); Boilers (O. Reg. 338/90); General Air Pollution Regulation (O. Reg. 346/90); Ambient Air Quality Criterion (O. Reg. 337/90). Lambton Industry Meteorological Alert (O. Reg. 350); Countdown Acid Rain controls at Ontario Power Generation (O. Reg. 355/90); Inco (O. Reg. 660/85); and Falconbridge (O. Reg. 661/85);
- additional guidelines and codes of practice developed and approved as ministry policy for use in Certificate of Approvals for combustion turbines, wood-fired combustors, municipal waste incinerators and crematoriums;
- development of standards, interim standards and "approvals screening levels" for VOCs on an ongoing basis; and,
- focused compliance assessments conducted by ministry staff on stack emissions from selected facilities each year as part of the ministry's inspection and auditing program. These assessments allow the ministry to determine a company's compliance with existing air pollution legislation. The information determined from these assessments may result in the implementation of abatement measures by the company. The actions completed result in reduced emissions of air pollutants, including smog precursor compounds.

Clear linkages have been established between the benefits of reducing PM and secondary pollutants. Controlling IP/RP will help with other environmental issues such as acid rain, ground level ozone and climate change.

> *"The Ontario Mining Association is pleased to participate with government and other stakeholders in the development of equitable and cost effective solutions to the smog problem in Ontario."*
> Barbara Mossop
> Manager of Environmental and Engineering Services
> Ontario Mining Association

Links of $\text{PM}_{2.5}$ and PM_{10} to Precursor Emissions and Other Air Quality Issues



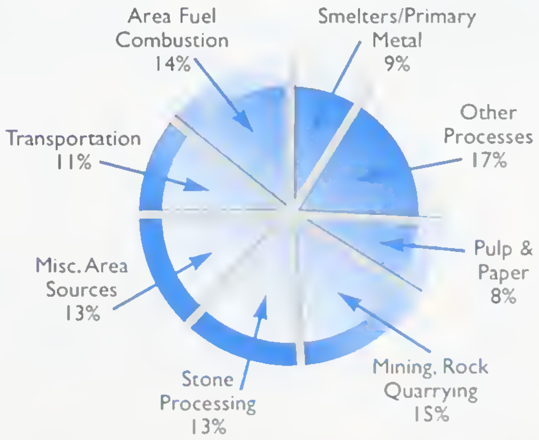
Note: Emissions of NOx and VOCs are an integral part of the chemistry of ground level ozone, a major component of smog. PM is connected also to the issue of hazardous air pollutants through organic carbon particles and metals, many of which are themselves toxic, and by the adsorption and absorption of other contaminants (such as semi-volatile organic compounds such as polyaromatic hydrocarbons and chlorinated organics) onto existing particles.

The work group has identified a clear need to obtain new source apportionment information for use in emission inventories for Ontario. Understanding the sources of IP/RP is one apparent challenge, but added to this is the need to understand how much originates in Ontario and how much is transported long-distance from the U.S. To develop standards, the work group has concluded that this inventory information is clearly needed. The U.S. EPA is focusing on research in this area, and from this it is expected that a determination of the extent of fugitive sources of PM_{10} from agriculture, construction activities and structural and natural fires can be made.

The work group suggests that pollution prevention and "*keeping clean areas clean*" are supplemental provisions to all the above options.

Ontario PM_{10} Emissions By Major Sectors

(Emissions From Point/Mobile/Area Sources, 1990 Estimates)



[1] emissions from road dusts, construction, agriculture, etc. are not included
[2] Emissions from open sources from the smelters are not available

The work group also recommends a parallel track approach – a policy decision to undertake emission reduction actions concurrent with efforts to bridge the knowledge gaps. In this context:

- In Ontario, measures should be introduced to reduce primary and secondary emissions, and community-specific reduction measures should be considered; and,
- The federal government should aggressively pursue PM and precursor reductions from the U.S.

Community-Specific Action to Reduce PM

The Particulate Matter and Ozone Options Assessment Working Group suggests a number of actions which could be taken on the community level to reduce the effects of PM and improve air quality:

- Compliance with current Point Of Impingement standards for total suspended particles, nitrogen oxides, sulphur dioxide, ammonia and specific VOCs
- Voluntary reductions beyond regulatory requirements
- Energy conservation efforts
- Use of cleaner technologies and processes as companies are upgraded
- Pollution prevention
- Transportation demand management
- Emissions testing programs
- Minimization of dust from paved and unpaved roads
- Greening of company fleets through cleaner-fuel vehicles and buses
- Dust control programs for industrial, construction and institutional sectors

3.2 Strategy meetings on the development of fine particulate matter standards

On May 13, 1999, the Smog Plan Steering Committee held a one day meeting including break-out sessions dedicated to seeking input to the development of Ontario's strategy on the reduction of particulate matter.

The objectives of the meetings on PM were to: (1) introduce Ontario stakeholders to the science, strategic options and reduction measures/actions for addressing the PM problem; (2) introduce Ontario stakeholders to the developments and linkages between the process for setting Canada-Wide Standards and the Ontario PM process; (3) establish areas of concerns and consensus for Ontario stakeholders; and (4) develop, if possible, an Ontario multi-stakeholder position to take to the national Canada-Wide Standards process.

As an outcome of the meetings, the committee prepared *Smog Plan Steering Committee Perspectives on the Development of Fine Particulate Matter Standards from the May 13, 1999, Meetings at Queen's Park, Toronto, Ontario*. Key messages and perspectives noted at this meeting include:

- There is recognition that air quality is an issue, and industry is engaged in emissions reduction actions.
- The committee (via the Particulate Matter and Ozone Options Assessment Working Group) is committed to the development of PM standards and it is prepared to work collaboratively toward setting PM standards and identifying reduction measures and actions.
- The committee supports independent scientific review to help develop PM standards in Ontario, and the committee wants the results of the review by the CRESTech-led expert panel to be considered.
- The committee wants a broad strategic plan which integrates land-use planning, transportation planning and reduction measures from industry, and encompasses other issues such as public education.

- The committee believes that in addition to provincial efforts, the federal government needs to recognize and address upwind transboundary pollution.

In addition, the committee supports the sharing of best management practices for the reduction of particulate matter.

3.3 Building Ontario's knowledge, science and technology

The PM and Ozone Options Assessment Working Group initiated a *Scoping Study on Information Gaps and Uncertainties in the IP/RP Compendium Document and their Impact on Strategic Options*. CRESTech (Centre for Research in Earth and Space Technology) and NERAM (Network for Environmental Risk Assessment and Management) were invited to form a technical secretariat to convene and assist a five-member interdisciplinary panel of Ontario academic researchers to provide an independent review of the Compendium Document. The panel commended the Ministry of the Environment's initiative in addressing the needs of the Operating Committee and the Particulate Matter and Ozone Options Assessment Working Group by preparing a document that reviews a broad range of topics (atmospheric science, control technology, exposure assessment, health effects assessment, cost-benefit analysis) essential for the development of sound policy on the IP/RP issue, and also commended its commitment to an open consultation process in allowing the document to be the subject of an independent review.

Expert Panel final report - Analysis of Strategic Options

"The Expert Panel agreed that although there are important information gaps and uncertainties impacting on strategic options, the science was of sufficient maturity to move forward and initiate actions to address the issue."

The expert panel agreed that information gaps and uncertainties cannot be used as a basis for postponing action. Seven strategic options for controlling ambient particulate matter in Ontario are presented in the Strategic Options document (the panel noted that other combinations of the strategic options presented are also possible). Three of the seven proposed strategic options were assessed by the panel to be non-viable: Air quality standards based on setting community-specific ambient air quality criteria or implementation dates for Air Quality Management Areas requires more detailed information on community-specific PM sources and receptors and community-specific costs and benefits. Harmonization with the U.S. is considered non-viable as the current U.S. EPA standard for PM$_{10}$ (150 micrograms per cubic metre of air) is considerably higher than the current Ontario interim standard (50 micrograms) and would not be considered protective of human health.

Expert panel recommendations on research directions

The panel recommended the following priority areas for further research to improve Ontario's capability to provide strong and balanced environmental policy on the issue of PM:

- **Assessment of the Ontario airshed:** Require a network of monitors to measure PM$_{10}$ and PM$_{2.5}$ across Ontario, to measure ambient concentrations, natural background levels and transboundary influences on regional air quality. Conduct studies of size, particle morphology and chemical composition. Develop source apportionment methods to target and optimize emission reduction strategies. Conduct further research into the production and loss of secondary particulates.
- **Assessment of human health impacts:** Conduct controlled human exposure studies among healthy and susceptible segments of the population. Conduct a longitudinal

epidemiological study within the province of Ontario. Conduct further research into the toxicity of IP/RP and the influence of co-pollutants as determinants of human health.

- **Socio-economic analysis of policy options:** Further develop a model for estimating the costs associated with air quality improvement measures. The model should use an Ontario-specific economic baseline measure and allow for the estimation of costs and benefits associated with a broad range of air-pollution-related health outcomes.
- **Evaluation of existing programs and policies:** Develop a broad risk-benefit model that can be employed to assess air quality regulatory policies. Develop a program for independent review of regulatory and non-regulatory initiatives within Ontario.

The final report, *Information Gaps and Uncertainties in the IP/RP Compendium Document and their Impact on Strategic Options, August 1999*, is available at the Centre for Research in Earth and Space Technology, 4850 Keele Street, Toronto ON M3J 3K1, (416) 665-3311. The report is also available electronically at the CRESTech Web site (www.crestech.ca).

3.4 Ontario Residential Wood Combustion Working Group

A multi-stakeholder work group was formed to identify options to reduce emissions from wood burning appliances and promote clean wood burning in Ontario.

One of the actions of the work group in 1999 was the ***Great Eastern Ontario Wood Change-out*** pilot project coordinated by the Hearth Products Association of Canada, in partnership with the Ontario Ministry of the Environment, Environment Canada, the Association of Registered Wood Energy Technicians of Ontario (ARWETO) and Natural Resources Canada. The project was designed to promote clean, safe and more efficient residential woodburning in eastern Ontario with the following key components:

- a public education campaign, with public work shops, newspaper ads and media events; and,
- a "change-out" program with rebates for people upgrading from old technology stoves and fire places to new clean-burning appliances.

The program was launched on Jan. 8, 1999, and ran until March 8, with accomplishments including:

- extensive media coverage in many local newspapers, with some running two or more articles with photographs on different aspects of the program;
- Eight Woodstove Workshops, with a total of almost 500 people attending; distribution of more than 1,000 copies of the NRCan/CMHC publication *A Guide to Residential Wood Heating* through the workshops as well as through dealers; and,
- a total of 113 official change-outs achieved from participating dealers.

To encourage Canadians to make better buying decisions when shopping for woodburning appliances, a communications strategy for wood heating was considered for the fall of 1999. As well, regulatory options to require the installation and/or use of clean-burning appliances are also being considered under the federal smog plan initiative.

"As a sector fully committed to continual environmental improvement, we appreciate the opportunity to participate in Ontario's Anti-Smog Action Plan. The collaboration approach of the ASAP has been instrumental in producing regulatory and non-regulatory initiatives that are both effective and efficient. We look forward to our continuing participation in the operating committee and working groups."

Craig Gammie
Manager - Energy and Environment
Ontario Forest Industries Association

4.0 Public awareness and engagement

The importance of engaging the general public, governments and businesses in the smog issue was underscored in Ontario's 1998 Smog Plan. Awareness and engagement are underlying principles of the Smog Accord and the Plan itself, and are cited as essential in many of the partners' reduction plans.

The constituency developed through the Plan continues to build. ASAP provides the framework for continual expansion through engagement of more participants. New and expanded work groups include Commercial and Industrial Printing, Plastic Processing, Windshield Washer Fluid, Industrial Architectural and Maintenance Coating and Particulate Matter and Ozone (PM/O_3) Options Assessment.

The approach to public engagement is proven and is being maximized through the work of Ontario's stakeholders. The public engagement strategy utilizes three key initiatives to get people involved: Smog Alerts, mandatory vehicle inspection and maintenance, and activity-based advocacy. These activities are playing a substantial role in raising awareness.

In Ontario, new initiatives are under way, building on the past year's progress:

- The viability of an "Ontario Clean Air Foundation" has been examined by a consortium of government, industry and environmental and health non-government organizations.
- The Ministry of the Environment has increased its participation in and sponsorship of related air-quality events such as those held annually by the Association of Municipalities of Ontario. The MOE has been a major sponsor for Pollution Probe's Clean Air Commute, and is collaborating to promote and encourage cleaner ways to commute. The ministry leads the Ontario Public Service in participation in the Clean Air Commute.
- Environmental non-government organizations, such as Pollution Probe, Toronto Environmental Alliance (TEA), Sierra Club and the Canadian Institute for Environmental Law and Policy, and health organizations such as the Ontario Lung Association are playing a substantial advocacy and activity-based role in raising public and media awareness of the health problems created by smog.
- Smog Alerts are being promoted province-wide.

"Signing the Provincial Smog Accord will complement the goals and strategies of the renewed strategies and actions approved by the Region of Hamilton-Wentworth Council in Strategies for a Sustainable Community. The approach of the Anti-Smog Accord is consistent with the approach taken with the Hamilton-Wentworth Air Quality Initiative (HAQI)."

Terry Cooke
Regional Chairman
The Regional Municipality of Hamilton-Wentworth

Region of Hamilton-Wentworth Joins Anti-Smog Accord

The Region of Hamilton-Wentworth, a leader in air quality management, has recently signed the Anti-Smog Accord. The region has developed a baseline data inventory for 1990 and is preparing a Letter of Intent. VOC emissions are reported for 1994 at the region's monitoring stations (Beach Boulevard, Vickers/East 18th; Elgin/Kelly; Gertrude/Depew; Pier 26). Inhalable particulate (PM_{10}) baseline data for 1992 to 1994 are also available at four stations.

Ontario's Public Service stimulates province-wide Smog Alert Program

Crucially important to Ontario's strategy is the protection of vulnerable citizens and workers. The Ontario Public Service implemented a Bad Air Day Program (hereafter known as the Smog Alert Program) in the spring of 1998, which enables smog reduction and health protection measures to be taken on projected high ozone episode days.

In 1999, *Smog Alerts, A Municipal Response Guide* was developed in partnership with regional municipalities. It provides a template for implementing a Smog Alert response, including air quality information, a process to provide public health messaging and guidance for public response, and recommendations for local government agencies to reduce smog. The municipal guide also includes communication activities including media kits, and instructions for delegation of responsibilities and assignments.

The Ontario Realty Corporation (ORC), through the Green Workplace Office, in conjunction with the Management Board Secretariat has also developed a Green Workplace Program to focus smog reduction activities on publicly owned and operated facilities.

The ORC communicates the program to facility management staff, and promotes it in the government's internal newspaper. Focusing on actions to take when Air Quality Advisories are issued, bulletins included directions such as turning down air conditioning in facilities, suspending lawn cutting and non-essential travel, and curtailing use of products such as pesticides, herbicides, paints and solvents.

The result of this initiative is that staff and facility management are aware of the intent, the notification network and actions to take during an alert.

> *"The ASAP partnership allows all sectors to work together in their efforts toward meaningful pollution reduction initiatives. If we can all lead by example, we will be able to call for similar reductions in the flow of transboundary pollution and experience improved air quality for all Ontarians."*
>
> R. Ross Reid
> President & CEO
> Ontario Lung Association

5.0 Sector progress: Smog precursor reductions and related activities

This section identifies a number of key areas of improvement in reductions of nitrogen oxides (NOx) and volatile organic compounds (VOCs) made by ASAP partners.

5.1 Transportation Sector

This sector is experiencing significant growth – characterized by increases in total number of vehicles, typical vehicle size and total number of vehicle kilometres per year. While progress continues to be made, pressures on smog reduction efforts are being experienced.

Four work groups make up this sector: Cleaner Fuels, Cleaner Vehicles, Transportation Demand Management and Off-Road Vehicles and Equipment. Most activity in this reporting period was in the Cleaner Fuels and Cleaner Vehicles work groups (sectors).

5.1.1 Drive Clean program

Vehicles are the largest local source of smog-causing pollutants. A cross-cutting initiative, referenced by both work groups in the 1998 Smog Plan, was the implementation of Ontario's Drive Clean program. Drive Clean is expected to achieve a 22 per cent reduction of fleet emissions in the program area (15 per cent NOx and 28 per cent VOCs) when fully implemented (2005/06) – about one-tenth of the target of a 45 per cent reduction in smog precursors. Phase 1 of Drive Clean began in April 1999 for light duty vehicles in the Greater Toronto and Hamilton-Wentworth areas. Biennial inspection is required for passenger vehicles four to 19 years old. In September 1999, heavy duty vehicles in the Drive Clean program also began annual emission testing throughout Ontario (diesel only; non-diesel testing is restricted to same areas as passenger vehicles). Heavy duty vehicle testing is expected to reduce emissions of airborne particulates by 220 tonnes in the first full year (2000). In 2001, the passenger vehicle testing program will be extended to other smog-prone urban and commuter zones in Ontario.

Marketing the Message to the Motoring Public

This program focuses on lifestyle change and communicates the program as well as the reasons for it. This social marketing campaign cross-cuts into the Community Engagement strategy described in Section 4.

The engagement plan now links the Drive Clean program directly with public health, while adding individual activities for direct public engagement.

Ontario government takes a leadership role to reduce smog

During a Smog Alert, the provincial government takes action to reduce smog at its own facilities. In addition, the Ontario Public Service is also keeping "clean hands" through implementing Drive Clean inspections and maintenance for government fleet vehicles.

Automotive Industries Association of Canada

The Automotive Industries Association of Canada and its members played a leadership role in the development of Drive Clean, assisting in the collection of preliminary data and meeting regularly with the Ministry of the Environment and with other stakeholders to discuss standards and implementation models. It is a member of the Minister's Advisory Committee and continues to promote the program's features and benefits to the industry at large, including more than 800 Drive Clean facilities serviced and supplied by AIA members.

Progress highlight

Signing on in 1997 under the Plan through a Letter of Cooperation, the Canadian Vehicle Manufacturers' Association reports implementation and delivery on voluntary actions including: providing on-board diagnostic systems (OBD-II) when appropriate fuels are available; phasing in enhanced evaporative emissions control systems; phasing in of on-board refuelling vapour recovery systems; and, phasing in reductions from light duty trucks. Harmonizing these activities with the U.S. is a foundation of their commitments.

Achievement of lower emission vehicles for the market is dependent on the availability of low sulphur fuel.

5.1.2 Cleaner Vehicles

Ontario is actively participating with the Canadian Council of Ministers of the Environment to ensure that its interests are represented. Nationally, Tier II standards for super ultra low-level emission vehicles (SULEVs) are expected to achieve NOx and VOC emission reductions for beyond 2004. As yet, the quantity of reductions has not been calculated.

The Canadian Vehicle Manufacturers' Association (CVMA) has reported considerable progress under its Letter of Cooperation. While progress has been made, the CVMA urges Ontario to lead, through the CCME, the promotion of improved national fuel requirements aimed at "optimizing the environmental benefit of the emission control technology on the new vehicles."

Automotive assembly facilities in Ontario have implemented projects aimed at reducing VOC emissions from their surface coating facilities, and these facilities are developing and implementing programs to meet the CCME *New Source Performance Standards and Guidelines for the Reduction of Volatile Organic Compound Emissions from Canadian Auto OEM Coating Facilities*, August 1995 (see Section 5.4.3, Surface Coating Automotive Parts).

Selected case studies - Canadian Vehicle Manufacturers' Association*

Project	Facility	VOC Reduction (tonnes/yr)
Conversion of waterborne base coat paints	DaimlerChrysler Bramalea Assembly Plant	143 tonnes
Paint shop replacement	Ford Ontario Truck Plant	Greater than 400 tonnes
Reduction in use of paint purge	General Motors Oshawa Autoplex - Truck Assembly Centre	200 tonnes
Solvent management program	DaimlerChrysler Windsor Assembly Plant	430 tonnes
Colour coat automation	Ford Oakville Assembly Plant	65 tonnes

* refers to case studies reported in the Fifth Progress Report from the Task Force of the Canadian Automotive Manufacturing Pollution Prevention Project.

The CVMA member companies and other manufacturers are still committed to participating in the Memorandum of Understanding on pollution prevention.

5.1.3 Cleaner Fuels

On June 4, 1999, Environment Canada published the final regulation limiting the sulphur level of gasoline. The regulation requires a maximum annual average level of 30 parts per million by Jan. 1, 2005, with a phase-in period between July 1, 2002, and Dec. 31, 2004, during which the average level of sulphur in gasoline must be less than 150 ppm. Current average levels of sulphur in gasoline in Ontario are over 500 ppm. This regulation also harmonizes our standard with those of 49 U.S. states for sulphur in gasoline.

The Ontario Ministry of the Environment has played a vital role in supporting the regulations to limit the sulphur level of gasoline, thereby reducing particulate matter and acid rain.

Vapour recovery for gasoline fuel delivery is also in place. The MOE believes it is most cost effective to address refuelling of vehicles through onboard vapour recovery. In the1998 model year, 40 per cent of the new vehicles had onboard vapour recovery. By 2000, all new vehicles will have this equipment. A regulation governing fuel dispensing rates has been published in Gazette I. The comment period is over, and most comments are positive. A final regulation is anticipated by the end of the year.

Natural gas as a clean alternative

The Canadian Natural Gas Vehicle Alliance has been active in promoting natural gas as an alternative fuel, pointing out that compared with tailpipe emissions from gasoline, toxins such as benzene are reduced by up to 100 per cent, VOCs by 92 per cent, sulphur dioxide by 83 per cent, carbon monoxide by 40 per cent, carbon dioxide by 25 per cent or more, and nitrogen oxides by 10 per cent or more. Compared to diesel, particulate matter is cut by well over 90 per cent. In addition, automotive natural gas systems are pressurized, eliminating vapour emissions from refuelling and evaporation.

> *"Anti-Smog Action Plan is important in bringing the business community into the pollution-reduction effort. Our members are making a major contribution through the Drive Clean inspection and maintenance program and would like to challenge other business sectors to make similar contributions to smog reduction."*
> David Leonhardt,
> Public and Government Relations Director,
> Canadian Automobile Association

5.1.4 Clean Marine Partnership

The various boating associations and the MOE first started to work together on a boater education program in 1995 to reduce the impact of grey water discharge from boats. At the suggestion of the boating associations, the education program was broadened to include other sources of pollution, i.e. black water, bilge water, fuelling, products used on boats and solid waste disposal.

The Clean Marine Partnership consists at present of five national and provincial boating associations (Canadian Marine Manufacturers Association, Canadian Power and Sail Squadrons, Ontario Boating Forum, Ontario Marina Operators Association and Ontario Sailing Association), the Ontario Federation of Anglers and Hunters, the Ontario Ministry of the Environment, Environment Canada, Terra Choice Environmental Services (Environmental Choice Program) and Georgian College.

For the past three years, the Partnership has been implementing a three-pronged strategy for reducing mostly water pollution from recreational boating in Ontario:

Clean Marine Products: Promoting the manufacture, distribution and use of green marine products.

Clean Marine Practice: Pollution prevention at marinas and yacht clubs through implementing Best Environmental Practices.

Clean Marine Promotion: An environmental education and public awareness program aimed at boaters, marinas and yacht clubs.

The potential for reduction in emissions of volatile organic compounds (VOCs) in the recreational boating sector is considerable because a new four-stroke marine engine produces only one-tenth the level of emissions of a fuel-injected two-stroke and one-40th the level of emissions of a regular two-stroke marine engine. The four-stroke marine engines are now available in all sizes for a variety of marine applications, but their market penetration continues to be low despite their superior environmental performance.

The opportunity exists to achieve the ASAP target of a 45 per cent reduction by 2015 in total VOCs and NOx emitted by marine sources in 1990.

5.2 Industry and Manufacturing Sector

By far the largest emissions sector, the industry and manufacturing sector, is represented in four sectoral work groups, with more than 20 sub-sectoral work groups working on emission reduction plans.

5.2.1 NOx Emissions Working Group

Progress in this sector is characterized by the recent development of the Canadian Portland Cement Association's Letter of Cooperation (LOC); proposed changes for environmental protection in the electricity sector as proposed in Bill 35; and changes in the rapidly diversifying natural gas industry. The electricity and natural gas industry reports are summarized in Section 6, Energy, Electricity Restructuring and Environmental Protection.

In the **cement manufacturing industry**, the Letter of Cooperation (LOC) from the Canadian Portland Cement Association (CPCA) identifies a process for establishing baseline information, implementing monitoring instrumentation in its members' plants, and reporting data and progress to the ministry on a regular basis. The CPCA's estimate of total NOx emissions by its members in 1990 is in the order of 13.1 kilotonnes per year. The CPCA has already estimated reduction of 1.5 kT/year since 1990 through efficiency improvements and process changes.

The CPCA has currently estimated emissions based on the U.S. Environmental Protection Agency's AP-42 emission factors for cement manufacturing, which reflect only the changes in process types but not any improvements from kiln operating conditions. Using these factors, total NOx emissions were reduced 3.5 per cent, while clinker production increased 10.7 per cent NOx emissions per unit of production declined by 12.8 per cent.

"The members of the Cement Association of Canada are committed to the Anti-Smog Action Plan. The collaborative approach provides the flexibility necessary to maintain a balance between environmental, economic and societal needs. We look forward to building on our achievements made since 1990 and to developing new technologies which will improve the air quality in Ontario."

Mike Pawlicki, Chair, Ontario Environment Committee
Cement Association of Canada

On Sept. 28, 1998, the CPCA wrote to the Minister of the Environment to outline the association's plan to address smog issues in Ontario. The important features of the CPCA plan include:

- support for the Ontario Anti-Smog Accord;
- a scheduled, multi-year plan for NOx reductions;
- extensive monitoring program to include continuous emissions monitoring at all Ontario plants;
- sharing of NOx emissions data with the MOE;
- NOx reductions where economically possible; and,

Canadian Portland Cement Association – Quick Starts

The Canadian Portland Cement Association (CPCA) has prepared a White Paper detailing cement kiln NOx emission generation. An evaluation of control techniques, feasibility and cost effectiveness has been completed and submitted to the MOE. The CPCA will report on results of Quick Starts by December 2000.

Both short term and long term targets for NOx and PM will be identified by July 2001. Protocols for monitoring particulates have been identified, and monitoring is taking place in selected North American plants.

- investigation of particulate emissions by the industry.

The CPCA's commitment for further reduction in NOx emissions will be further developed after new monitoring data and processes are assessed.

5.3 NOx and VOCs Emissions Working Group

Three major sub-sectors are represented in this work group: Iron and Steel; Petroleum Refining and Chemicals.

5.3.1 Iron and Steel sector

The Iron and Steel sector has made considerable progress in realizing reductions from its coke ovens by minimizing leaks in new maintenance programs. This sector is on track with reduction plans.

In addition to signing Ontario's Smog Accord, Ontario steel companies have subsequently signed the Canadian Steel Producers Association (CSPA) Statement of Commitment and Action (SCA). The SCA states that Ontario companies will develop written objectives and targets to reduce the amount of NOx generated.

The previously reported NOx and VOC reductions prior to 1996 originated from Atlas, Dofasco, Stelco Hilton Works and Lake Erie Steel. To date, NOx and VOC reductions include those from other plants such as Slater, Gerdau, Algoma and Ivaco.

The Iron and Steel sector achieved a two kilotonne NOx reduction from the base year 1996 to the end of 1998 and committed to achieve a further 1.5 kT by 2001. It has also achieved a 0.4 kT reduction in VOCs and is committed to an additional 0.6 kT reduction in VOCs by 2001.

Iron and Steel NOx Emission Reduction Plan

The Iron and Steel NOx Emission Reduction Plan is illustrated by the following accomplishments:

- **Complying with national emission guidelines for commercial and industrial boilers and heaters.** The Canadian Steel Producers Association (CSPA) Participants are investing significant capital in low NOx combustion technology for new and modified boilers and furnaces. By demanding the lowest possible emission level, the CSPA is encouraging the development of low NOx burners and methods for predicting and reducing NOx emission levels from industrial furnaces. Emission guidelines are based on currently available low NOx burner technology.
- **Iron and Steel Sector participation in the Canadian Industrial Program For Energy Conservation (CIPEC).** Since 1990, the steel sector has reduced specific energy consumption by 19 per cent (Voluntary Challenge and Registry Inc., 1998 Annual Report). The steel sector has extended its commitment to improve specific energy consumption by one per cent per year to the year 2010.

Other Initiatives

- Stelco Hilton Works has allocated funds for the purchase of portable emission monitoring equipment (NOx , SO2, O2 and CO) and for annual testing of emission sources. The emission monitoring program will improve the quality of the emission inventory, identify emission reduction opportunities, and help to ensure that boilers and furnaces are operated and maintained to minimize emissions.
- The installation of vent emission control technology at some facilities is reducing VOC emissions from by-product plant process and product storage vessels. For example, at Lake Erie Steel Company, vent emission controls have been installed on the tar decanters, tar dehydrators and tar storage tanks. In 1999 construction was scheduled to begin on the vent emission controls for the light oil plant area. Programs are also in place to maintain and repair coke oven batteries and improve the sealing of coke oven doors. These activities reduce the escape of VOC emissions from the coking process.
- The CSPA Participants (Algoma, Dofasco, Lake Erie Steel and Stelco Hilton Works) are publicly committed (Statement of Commitment and Action) to comply with the Strategic

Options Report (SOR) recommendation on benzene emission reduction. The steel sector has prepared an Environmental Best Practice Manual for benzene emissions from by-product plants. The resulting emission reduction commitments (in terms of grams per tonne of coke produced) are 68 per cent by 2000, 82 per cent by 2005 and 84 per cent by 2015.

Iron and Steel particulate emission reductions

Reduction of particulate emissions has been an on-going activity at steel plants for many years. Process changes for particulate emission reductions in 1998 include: improved emission control using high efficiency filter baghouses; improvements in electric arc furnace off-gas controlsystems; increased use of water cooling for off-gas systems; and "pave, clean, green" activities that include routine paving and mobile sweeping programs for the purpose of dust suppression.

CPSA Partners are developing a particulate emission inventory and have in place strategies for emission reductions. "Pave, Clean, Green" approaches and fugitive emissions and dust capture techniques are being implemented at Atlas, Dofasco, Gerdau Courtice and Slater Steel.

Canadian Steel Producers Association – progress highlight

The Canadian Steel Producers Association reports a steady reduction in nitrogen dioxide from 10,065 tonnes a year (1990-92) to 8,028 tonnes a year in 1998. Significant capital is being invested in low NOx combustion technology for boilers. Procurement policies in place at Gerdau Courtice, Dofasco, Stelco Hilton Works and Lake Erie Steel have played a significant role in NOx reductions.

> *"The ASAP partnership provides us with the flexibility to make effective emission reductions which will contribute both to achieving the Ontario air quality goals and to maintaining our competitive position. We are reducing NOx, VOC, SO2, and particulate emissions by integrating the Ontario emission reduction goals into our business decisions and long term planning. In fact, we have already made great progress by reducing NOx emissions by 20% and VOCs by 39% since 1990. We are committed to making further progress on our performance."*
>
> Vasudha Seth
>
> Chair, Canadian Steel Producers Association, Environment Committee
>
> General Manager Environment & Energy, Dofasco Inc.

Progress Highlight

Canadian Petroleum Products Institute (CPPI) member companies are implementing Quick Start initiatives and have identified long term reductions. They forecast NOx reductions of 0.4 kilotonnes a year from the 14 kT baseline (1990) and VOC reductions of 11.9 kT from the baseline of 47 kT (1990) to the year 2005. The CPPI is embarking on an initiative to develop an emissions inventory for primary and secondary emissions of particulate matter from member facilities.

5.3.2 Petroleum Refining sector

The Petroleum Refining sector has made progress in quantifying fugitive emissions and reductions. Reductions are being calculated based on the guidelines from the Canadian Council of Ministers on the Environment for fugitive emissions from equipment leaks (LDAR – Leak Detection and Repair) and from above-ground storage tanks.

The Canadian Petroleum Products Institute (CPPI) will be making substantial contributions toward cleaner fuels by making reductions in sulphur and benzene content, as well as providing a lower vapour pressure gasoline. The institute reports that projecting forecasts into the year 2010 and 2015 is difficult owing to emerging product formulations such as levels of sulphur in gasoline and the overall level of demand for products.

CPPI Anti-Smog Action Plan Report March 1999
Quick Starts

	Initiative	Reduction Target	Implemented
1	Lower vapour pressure summer gasoline		
	11.5 psi to 10.5 psi	VOC 10.5 kT/yr	1989
	10.5 psi to 9.0 psi	VOC 8.0 kT/yr	1997
2	Lower sulphur on-road diesel – 500 ppm	SO2 4 kT/yr SO4 0.1 kT/yr	1997
3	Reduction in gasoline benzene content to1%(v)	VOC 0.7 kT/yr	1999
4	Gasoline distribution vapour recovery (Stage 1)	VOC 19 kT/yr	1993-97
5	Leak detection & repair programs at refineries	VOC 10 kT/yr	1994-98
6	Tank vapour controls	Incl. In #5	1998
7	Low NOx burner technology for boilers & process heaters	NOx reduction of 50% with new low NOx technology	Under way
8	Energy conservation	1%/yr energy intensity improvement Achieved 2.2%/yr NOx reduction to be quantified	1998

5.3.3 Chemicals Sector

The Chemicals Working Group is projecting achievement beyond the ASAP target. The Canadian Chemical Producers Association (CCPA) jointly with Environment Canada, the Ontario Ministry of the Environment and Alberta Environment is developing a national Memorandum of Understanding and Annex to address VOCs and other pollutants. To date, the companies have reduced VOC emissions from the 1990 baseline level by 43 per cent.

Progress Highlight

Dupont achieves 38% reduction in VOCs since 1996

At its Maitland site, Dupont Canada Inc. manufacturers intermediate chemicals for nylon, specifically adipic acid and hexamethylenediamine. The chemical reaction process used to produce adipic acid results in the emissions of VOCs. Dupont added equipment and process steps in an effort to improve yield. By incorporating this "new twist" in the existing technology, Dupont achieved a significant reduction in waste generation and VOC emissions. Dupont's innovation has resulted in a 38 per cent reduction in VOC emissions since 1996.

"The ASAP process is an innovative approach to dealing with a pressing air quality issue. For the first time, all stakeholders who can make a change are around the table working in partnership to achieve improved air quality."

Bob Clapp
Vice President Ontario Division, Canadian Petroleum Producers Association

CPPI Anti-Smog Action Plan Report March 1999
Longer Term Initiatives

	Initiative	Target	Implemented
1	Energy conservation	1%/yr	2000+
2	Lower sulphur gasoline	30 ppm Reduction in tailpipe emissions from auto fleet; NOx 15% VOC 6.5% (S) VOC 9.5% (W)	2005
3	Leak detection & repair	Ongoing program	
4	Storage tank vapour control	Program in place to achieve 10kT/yr reduction in VOC	2008
5	Low NOx burners	All burners replaced – 50% NOx reduction	2015
6	Develop PM methodology & protocols	Methodology & protocols in place	2000
7	Quantify PM emissions based on protocols	Inventory available	2001

5.4 Surface Coating Emissions Work Groups

5.4.1 Surface Coating Automotive Manufacturing

Five automotive companies, the Canadian Vehicle Manufacturers' Association and the Ministry of the Environment have drafted a Memorandum of Understanding. In the MOU, the companies agree to achieve the standards set out in the *New Source Performance Standards and Guidelines for the Reduction of Volatile Organic Compound Emissions from Canadian Automotive OEM Coating Facilities by 2005*, CCME, *October 1997*. More than half of the 15 assembly plants have already achieved the VOC emission standard.

In addition, companies participating in the Canadian Automotive Manufacturing Pollution Prevention Project have reported on VOC emission reductions of 4,500 tonnes per year.

Progress Highlight

Late in 1998, the Chrysler Pillette Road Assembly Plant reported on a project it implemented to achieve the interim CCME standards. The facility implemented a five-part program:

- product substitution (new paint reducer, reusable equipment covers and water soluble coatings);
- facility improvements (upgrade spray booth purge capture, install purge pots in the spray booth, install dedicated spray guns and seal spray booth walls);
- solvents management (employee training, routine booth audits and plant specific training manuals);
- supplier co-operation (material usage trending); and
- bench marking other facilities for best practices.

5.4.2 Surface Coating Automotive Refinish

Eighteen area-based auto body associations formed an association in May 1998 to develop a self-management proposal similar to that of the Ontario Motor Vehicle Industry Council (motor vehicle dealers). They recommended that standards and codes of practice for auto body refinishing be made ministry policy and included as conditions in Certificates of Approval. A mandatory education and training program was also proposed. The Canadian Paints and Coatings Association proposed that the VOC coating content requirements in the CCME standard be regulated in Ontario and across Canada. These proposals, which would reduce VOC emissions by 45 per cent, are being considered by the government.

The Ontario Ministry of the Environment has worked in consultation on two documents for the development of codes and standards: *National Standards for the VOC Content of Canadian Commercial / Industrial Surface Coating Products – Automotive Refinishing*, CCME, October 1998; and, *National Standards and Guidelines for the Reduction of VOCs from Canadian Commercial / Industrial Surface Coatings – Automotive Refinishing*, CCME, October, 1998.

5.4.3 Surface Coating Automotive Parts

Reflective of the growth and increased parts outsourcing in the automobile industry, this sector's emissions have increased by 236 per cent since 1990 (from 4,675 tonnes a year to 11,000 tonnes in 1996).

A review of VOC emission control technologies, codes of practice, coatings application equipment and coatings in Canada and the United States was carried out. The review suggested the following actions to reduce emissions:

- Specification on the VOC content of coatings for metal and plastic substrates (equal to U.S. EPA) – five per cent reduction in VOC emissions expected;
- Minimum transfer efficiencies for application equipment (equal to the best of the U.S. states) – 39 per cent reduction in VOC emissions expected;
- Codes of operating practice (equal to the best of the U.S. states) – five to 10 per cent reduction in VOC expected; and,
- Use of VOC emission control technology for facilities using more than 25 tonnes of VOCs per year – 22 per cent reduction in VOC emissions expected. Some U.S. states offer the installation of VOC emission control technology as an option to the use of compliant coatings, application equipment standards and codes of practice.

Four large facilities in Ontario have VOC emission control equipment. Most facilities use high efficiency transfer equipment and high-solids solvent-based coatings and have aggressive codes of operating practice in place. Some facilities have switched to water-based coatings. An MOE study is currently under way in concert with industry and suppliers to assess the technical and economic feasibility of VOC emission control equipment and further quantify the VOC reductions.

5.4.4 Wood Products

There are about 20 large and 100 small furniture manufacturing facilities in Ontario. The work group is composed of 17 large manufacturers and suppliers of coatings and application equipment, the Ontario Furniture Manufacturers Association, the Canadian Paint and Coatings Association, the Business and Institutional Furniture Manufacturing Association and the Canadian Kitchen Cabinet Association.

A review of VOC emission control technologies, codes of practice, coatings application equipment and coatings in Canada and the United States was carried out. The review suggested the following actions to reduce emissions:

- Specification on the VOC content of coatings (equal to U.S.EPA) – five per cent reduction in VOC emissions expected;
- Minimum transfer efficiencies for application equipment (equal to the best of the U.S. states) – 15 per cent reduction in VOC emissions expected;
- Codes of operating practice (equal to the best of the U.S. states) – five to 20 per cent reduction in VOC emissions expected; and,
- Use of VOC emissions control technology for facilities using more than 25 tonnes of VOCs per year – 38 per cent reduction in VOC emissions expected. Some U.S. states offer installation of VOC emission control technology as an option to the use of compliant coatings, application equipment standards and codes of practice. Very few facilities in the U.S. have exercised this option.

No facilities in Ontario have VOC emission control equipment. Most large facilities use high efficiency transfer equipment and have aggressive codes of operating practices in place. Some facilities have switched to water-based coatings. In the summer of 1998, the ministry in concert with the industry and suppliers initiated a study to assess the technical and economic feasibility of VOC emission control equipment and the potential for the implementation of codes of practice to achieve much greater VOC emission reductions.

5.4.5 General Metal Finishing

The work group as a whole has not met to report on progress. One member, however, John Deere Welland Works, has continued to see progress in VOC reductions. Reporting 0.1771 kilotonnes a year of VOCs in 1990, the company moved forward to identify and implement Quick Starts and identify short term targets.

5.4.6 Consumer Coatings

The Canadian Paint and Coatings Association (CPCA) and Environment Canada signed a Memorandum of Understanding in 1995 regarding annual reporting of the volume of VOCs contained in consumer paint sold in Canada. In 1997, the CPCA reported that the VOC emissions from consumer/trade coatings were 24.7 per cent below 1990 levels – a further reduction of 513 tonnes since 1995. The CPCA has begun to develop and implement a Paint Care program similar to the Canadian Chemical Producers Association's Responsible Care Program.

5.4.7 Can Coatings

With an estimated 1,000 tonnes a year of VOC emissions, Ball Packaging Products has moved forward with quick starts identified when joining the ASAP Partnership. For example, incinerators have been installed; product substitution is ongoing; modifications in incinerators have improved the capture rate. Continual improvements are expected in these areas over the longer term. Ball estimates that emission reductions of more than 48 per cent (480 tonnes) have been achieved through these measures.

Reductions Through Procurement Policies

John Deere reports continuous improvement with its solvent management process:

- Reduced the aromatic content of the make-up solvent from 55% to 0.6%
- Substituted less volatile solvent ingredient in flowcoat paint;
- Reduced flowcoat operating pressure from 19% to 17%; and,
- Switched to paint with better electrostatic wrap for topcoat.

John Deere's paint supplier is proposing to reformulate the flowcoat paint to reduce the make-up solvent by 20 per cent by 1999/2000. The long-term reduction plan which is now in place identifies conversion to waterborne flowcoat paint and eliminates adding the flowcoat process make-up solvent by 2005.

Industrial Architectural and Maintenance Coating Work Group

This sub-sector has begun to meet as a result of an initiative launched in October 1998 by the Canadian Council of Ministers of the Environment to develop standards and codes of practice for the traffic paints and industrial maintenance coating sub-sectors. Baseline emissions for 1990 have been identified, and emissions for 1995 and 1997 have been received by the Ministry of the Environment.

Baseline emissions for traffic paints were 3.2 kilotonnes a year in 1991 and 1.1 kT/yr for industrial maintenance coatings. For traffic paints, an 8 per cent reduction (300 tonnes/yr) has been reported; while industrial maintenance coatings have increased 124 tonnes/yr (11 per cent growth).

The work group has met a number of times over the past few months. Regulatory requirements in the U.S. were reviewed. Options for reducing VOC emissions were examined, including: standards on the VOC content of the coatings; use of water-based paints; use of more efficient application equipment; and improved codes of practice.

Most work group participants agreed that traffic marking provided the greatest potential for VOC reductions and they decided to pursue the traffic marking sector first. In the traffic marking sector, most agreed that the industry could switch from solvent-based coatings to water-based coatings for maintenance coating jobs, while solvent-based coatings must be retained for construction coating jobs because of weather conditions. With this change, a significant reduction in VOC emissions would be realized.

5.5 General Solvent Use Emissions Work Group

5.5.1 Commercial and Industrial Printing

The anti-smog action plan and the proposed development of a CCME Code for the printing industry provided the impetus for the Canadian Plastics Industry Association (CPIA) to establish a VOC Reduction Task Force in Ontario in 1998. This Task Force, comprising mainly packaging printers (printing on plastics), has a mandate to provide input on VOC reduction plans for this sector. The initial actions of the task force included education seminars on current and project reduction technologies, planning activities for data gathering and emissions inventories. This task force has also agreed to become an official work group.

A CCME *Environmental Code of Practice for the Reduction of Volatile Organic Compound Emissions From The Commercial/Industrial Printing Industry* was published in August 1999.

In the lithographic (paper printing) sector, many companies have reduced VOC emissions through pollution prevention actions, e.g., material substitution to eliminate alcohol from fountain solutions. Through Ontario's Printing and Graphics pollution prevention Memorandum of Understanding, several companies are also reporting VOC reduction success stories, totalling over 400 tonnes per year of VOCs reduced.

5.5.2 Plastics Processing Work Group

The Plastics Processing Work Group, a provincially led group, was formed in 1997. It comprises 11 companies, three government departments (including Environment Canada), and the Canadian Plastics Industry Association. Four sub-sector groups were formed, covering expanded polystyrene foam, extruded polyethylene foam, vinyl and composites. These represent about half of the total emissions for the sector. In 1998, each reviewed its VOC emissions, identified issues and challenges and outlined initiatives and alternative strategies for reducing VOCs.

A 12 per cent (300 tonne) reduction in VOC emissions from the 1990 baseline of 2.5 kilotonnes a year had been realized by 1997. This has been achieved by various means, such as resin reformulation by suppliers, process and equipment changes and industry consolidation.

The CCME guideline for VOC reduction from the plastics processing industry has been a key focus for discussion of reduction strategies for this work group. This code is intended to be applied to new facilities only.

Plastics Processing Work Group

The Plastics Processing Work Group has made a general commitment to continue to reduce VOC emissions, including reductions at existing facilities, to the extent possible under Best Available Control Technology, Economically Achievable (BACTEA) principles.

5.5.3 Asphalt Cutback and Emulsion Sector

Road building departments of the various levels of government – municipal, provincial and federal – are major users of these materials. VOC emissions result from the use of solvent-based liquid asphalts in road building operations.

The major user of liquid asphalts in Ontario, the Ministry of Transportation, has taken a lead within Canada by specifying emulsion rather than cutback in its procurement policies over the past 20 years. Now, the readily available asphalt emulsion (a low-solvent, water-based asphalt alternative) represents more than 97% of the total liquid asphalt used in Ontario. This has resulted in significantly lower VOC emissions – currently estimated to be some two to five kilotonnes a year.

5.6 Consumer Products Work Group

For this initiative, Ontario is awaiting the outcome of the Environment Canada national process. While there is some discussion continuing around the 1990 baseline emissions data, a task force has been formed. A key feature in the discussions will be whether Canada should harmonize with the U.S. standard. Once Environment Canada proposes a recommendation, Ontario can determine the course of action it wishes to take.

This sector is represented at the ASAP table through the Canadian Cosmetic, Toiletry and Fragrance Association and the Canadian Manufacturers of Chemical Specialties Association, which report that "long term targets are to be harmonized with U.S. products, anticipated to give approximately 20% reduction in VOC emissions. Details are being developed with Environment Canada because products are distributed nationally."

Windshield Washer Fluid Sub-Sector Work Group

In June 1998, the CCME initiative was expanded to include windshield washer fluid. A work group has been formed and has met a number of times. A draft report, *Assessment of the Environmental impact of VOC solvent emissions from windshield and the potential reduction in VOC Solvent Emissions from the use of Windshield Washer Fluid* (WWF), was prepared. The 1995 emissions estimate is 24,000 tonnes per year. Further investigation of a number of emission reduction options includes: limiting the VOC content of WWF; restricting the sale of summer and winter formulations (winter 38 per cent VOC, summer four per cent); public education; and a more efficient application system.

The work group consists of the Canadian Vehicle Manufacturers' Association, four car companies, three chemical companies, the container manufacturers and the Automotive Industries Association.

6.0 Energy, electricity restructuring and environmental protection

6.1 Ontario Hydro commitment (1991) – carried on by Ontario Power Generation:

The commitment by Ontario Hydro – now Ontario Power Generation Inc. (OPGI) – to the Anti-Smog Action Plan is to limit emissions of nitrogen oxides to 38 kilotonnes (NO units) in the year 2000 and beyond.

OPGI has made substantial improvements in the emission rate from its fossil units; however, increased demand for fossil power caused by difficulties with nuclear units has resulted in an increase in total NOx emissions. Nitrogen oxide emissions have risen to 55.8 kilotonnes in 1998 from 50 kT in the 1990 baseline year for the Plan, and a low of 29 kT in 1995.

The actions being undertaken by OPGI for the year 2000 are forecast to reduce Ontario Hydro/OPGI's average NOx emissions rate by 28 per cent compared to 1997, when major problems with nuclear units were first identified

Key initiatives in 1998:

- Burner conversions at the Lennox generating station provided the capability to operate two of the station's four generating units on either natural gas or oil.
- Low NOx burners were installed on three more units at the Nanticoke generating station. Five of Nanticoke's eight units have now been converted. Work is being scheduled for conversion of the remaining three.

Ontario Hydro (now OPGI) has been an active participant in the Pilot Emission Reduction Trading Project (PERT) since 1996. Ontario Power Generation is expected to utilize NOx emission reduction credits from the PERT program toward its commitment to limit NOx emission to 38 kilotonnes (NO) in 2000 and beyond.

Changes under way in Ontario's electricity market

In November 1997, the Ontario government released a White Paper, *A Direction for Change: Charting a Course for Competitive Electricity and Jobs in Ontario*, describing the government's intention of moving the Ontario electricity industry from monopoly to competition.

In the White Paper, and in various public statements, the government has committed to maintaining and improving environmental protection in an open electricity market.

In May 2000, the Ontario government intends to require that all electric power generation companies and their facilities in Ontario's electricity sector report annually on their emissions of oxides of nitrogen (NOx), sulphur dioxide (SO2) and a variety of other substances of concern such as mercury and carbon dioxide (CO2). This requirement is designed to ensure that strong environmental protection measures are in place from the beginning of Ontario's competitive electricity market, which is scheduled to open in late 2000.

Generating facilities with a capacity of more than one megawatt, enough to meet the needs of 100 average homes, would have to report, as a minimum, the type of fuel they use and the amount of electricity they generate during a 12-month period.

In practice, cleaner-burning, natural gas-fired generating facilities would only be required to report NOx and CO2 emissions. Oil-fired and coal-fired generating facilities would have to report on these pollutants and on emissions of SO2 and other substances of concern, such as mercury.

The Ministry of the Environment is developing a regulation to cap emissions from the new mix of companies which will be participating in Ontario's electricity market. The new limits will begin January 1, 2001, for the province's electricity sector and will be expanded to cover emitters in other major economic sectors of the province. The proposed net limits would cap total annual emissions from coal- and oil-fired electricity generating stations in Ontario as follows:

- an annual cap for NOx of 36 kilotonnes (kT) per year for the year 2001 (this regulated limit will replace the current voluntary commitment); and
- an annual cap for SO2 of 157.5 kT per year for the year 2001.

The government is also proposing emission performance standards to specify environmental requirements for all electricity sold in Ontario. These emission standards would apply to generators in Ontario and to generators outside of Ontario selling into the province. In this way, the government intends to ensure that even imported electricity that is used in Ontario is produced in compliance with the province's new emissions standards.

6.2 Gas Combustion Turbines

Combustion turbines, also known as gas turbines, are used in natural gas compressor stations, and in privately owned electricity generation. The Ministry of the Environment estimated in 1994 that a reduction of 29 kilotonnes a year in NOx emissions from combustion turbines will be realized between 1995 and 2015 as guided by *Atmospheric Emissions From Stationary Combustion Turbines*, MOE 1994, although this reduction could be matched by growth of NOx emissions from new combustion turbines. However, without the implementation of government policies and regulations requiring NOx emission limits, the emissions of NOx to the environment would be significantly greater.

The 1994 estimate for future NOx emissions by combustion turbines was estimated under the assumption that Ontario's electrical base load would be met by Ontario Hydro's nuclear and hydroelectric facilities. However, more recent events have introduced some uncertainty of prediction for Ontario's electrical system. It is possible that in the foreseeable future, all or some of Ontario's nuclear generating stations could be replaced by natural gas-fired combustion turbine generators. For each 1,000 megawatts of "base load" electrical generation removed from nuclear power and instead generated by high-efficiency, combined-cycle, natural gas-fired generation with low-NOx combustion, Ontario's total NOx emissions would increase by approximately six kilotonnes a year. (However, the total would decrease if such high-efficiency natural gas generation were to replace current coal-fired generation.)

Progress Highlights - NOx Reductions Work Groups

Within the NOx Emissions Work Group, three sectors are committed to achieving quantifiable NOx reductions:

From 1990 to 2000, Ontario Hydro (now Ontario Power Generation Inc.) is committed to achieving NOx emission reductions from 50 kilotonnes a year (NO units) to 38 kT/yr.

Between 1990 and 1995, Ontario copper and nickel producers reduced their NOx emissions from 53 to 10 kT/yr.

Between 1990 and 1998, Ontario Portland Cement producers reduced their NOx emissions from 13.1 to 11.6 kT/yr.

6.3 Boilers and Heaters

According to *Towards a Smog Plan for Ontario*, residential, commercial, institutional and industrial boilers and heaters in the province emitted approximately 60 to 70 kilotonnes a year of NOx in 1990. During summer daytime smog episodes in southern Ontario, large industrial boilers emit significant amounts of NOx.

NOx emissions from boilers and heaters can be reduced by energy conservation, efficiency improvements, fuel substitution, changes in equipment, and combustion improvements.

6.3.1 1998 CCME National Emission Guideline for Commercial/Industrial Boilers and Heaters

In March 1998, the Canadian Council of Ministers of the Environment approved a new *National Emission Guideline for Commercial/ Industrial Boilers and Heaters*. Most provinces and seven major industry associations have now endorsed this guideline for facility use.

In September 1999, the Ontario Ministry of the Environment posted for 60 days on the Environmental Bill of Rights Registry a new, proposed policy to implement in Ontario the *1998 CCME National Emission Guideline for Commercial/Industrial Boilers and Heaters*. This guideline imposes limits on emissions of nitrogen oxides by new, large boilers and heaters. The guideline also recommends voluntary partnership activities to reduce NOx emissions from smaller and/or older equipment.

This guideline establishes limits for NOx emissions from new boilers and heaters with fuel energy input greater than 10 million British thermal units (10.5 gigajoules) an hour. These large boilers/heaters are responsible for about 35 per cent of the total boiler energy consumption in Canada and are responsible for emitting about 67 kilotonnes a year (1990 baseline) of NOx, or about 11 per cent of Ontario's total NOx emissions. At forecast rates of growth, this 67 kT/y would increase to 92 kT/y by 2015 if Ontario did not implement any reduction measures.

If Ontario implemented the CCME guideline, the large boilers/heaters affected by the guideline would emit only 63 kT/y of NOx in 2015, including growth of the relevant sectors. The CCME guideline specifies limits in the emission rates for NOx from new, large boilers/heaters, based on the type of fuel and size of burner, with a credit for high efficiency. The permitted NOx emission rates range from 26 to 125 grams of NOx per gigajoule of fuel energy.

The new Boilers and Heaters Guideline also recommends three other measures to reduce NOx emissions:

- A voluntary NOx reduction program for large facilities – Some major Ontario industries (iron and steel, chemicals, petroleum refiners) are already proceeding with such reductions in partnership with the Ministry of the Environment.
- An inspection and maintenance program for existing boilers/heaters — The ministry's Environmental Partnerships Branch has formed a partnership with Union Gas, Enbridge Consumers Gas and NRCanada to publish and distribute *A Guide to Combustion Efficiency and Reduced Emissions* (in progress), for owners of boilers/heaters. The guide will be ready for publication in January 2000. The Environmental Partnerships Branch and its partners will use this guide in their efforts to market efficiency, low emissions and energy services to their clients.
- Development of Canadian Standards Association (CSA) standards to regulate NOx emissions from new, smaller combustion equipment.

The proposed policy has been harmonized with the ministry's (draft) Standardized Approval Regulations. In addition, two industry associations, the Canadian Steel Producers' Association and the Canadian Petroleum Products Institute, have already endorsed the guideline. Some major boiler operators, including Toronto District Heating Corporation and some members of the Lambton Industrial Society, have already converted their boilers to low-NOx.

6.4 Natural Gas

The Ontario Natural Gas Association (ONGA) reports that a comprehensive restructuring of the association is under way. In 1990, Ontario natural gas transmission and distribution companies emitted 5.1 kilotonnes of nitrogen oxides. These companies are active participants in national programs to reduce emissions of greenhouse gases. Through their participation in these programs, some Ontario natural gas companies have specified year 2000 targets for reduction in emission of greenhouse gases, which will also result in reductions in NOx and VOCs.

Ontario natural gas companies have implemented smog reduction measures which have resulted in 0.2 kT/yr of NOx emission reductions since 1990. At this rate, the 45 per cent reduction target would be achieved by 2015, as planned, but these reductions have not compensated for growth in the pipeline system. ONGA member companies face a challenge to meet their reduction goals as the system expands owing to increased demand for natural gas.

"Enbridge Consumers Gas has a long history of contributing to a healthy environment and is supportive of the ASAP approach in helping to develop a collaborative made-in-Ontario solution to help resolve this environmental problem. By distributing Natural Gas, the environmentally friendly fuel, and by encouraging our customers to use it as efficiently as possible, Enbridge believes that it can play a critical role in helping to reduce smog."

Rudy Riedl
President
Enbridge Consumers Gas

6.5 Emission Reduction Trading

The Energy Competition Act (Bill 35) has provided the powers to write regulations under the Environmental Protection Act allowing the use of economic instruments such as emissions trading to lower the cost of meeting limits on emissions.

A Letter of Understanding (LOU) with the Ministry of the Environment encourages participation in the Pilot Emission Reduction Trading (PERT) Project by providing participating industries with some assurance, but no guarantee, that emission reduction credits created when reductions are made according to PERT criteria, will be recognized when applied toward voluntary commitments.

Emission Reduction Trading encourages companies to reduce air emissions faster than required by regulation or agreement by allowing a company to earn credits from the reductions resulting from the early adoption of emission reducing processes and technologies toward future requirements or going beyond existing requirements. Under PERT trading rules, these credits can be banked for future use or sale in supporting voluntary reduction commitments. It is important to note that when referring to PERT trading rules or criteria, that PERT does not endorse, sanctify, or affirm the credibility or value of the pilot trades that it posts.

On July 8, 1998, the minister signed a Letter of Understanding with the PERT industrial participants. On March 30, 1999, the Letter of Understanding was extended to March 31, 2001.

Participants in PERT are working to identify and resolve stakeholder concerns with trading program design elements and most importantly to evaluate the environmental and economic benefits of using emission reduction credit trading as a tool to improve air quality.

PERT is an industry-led initiative, and participants include: the Ontario steel makers (Dofasco, Stelco); the natural gas companies (Union Gas, Enbridge Consumers Gas); Ontario Power Generation; John Deere; Shell Chemicals; Pollution Probe; the Asthma Society; STOP (a Montreal-based environmental organization); Environment Canada and Industry Canada. The MOE also participates in PERT.

PERT has drafted a set of emission trading rules which will assist stakeholders in better understanding risks and opportunities associated with emissions trading.

There is an evolving global trend toward using a more flexible mix of environmental and economic management instruments, such as emission reduction trading, to complement regulatory protection.

Several demonstration creations and trades of emission reduction credits have already been carried out by industries participating in PERT:

- NOx and VOC credits created from the scrapping of 140 high emission vehicles by ProtectAir Inc. (approximately 0.2 tonnes);
- Credits created by Environmental Interface through NOx reductions from energy-saving retrofits of school and hospital buildings in Toronto;
- 400 U.S. tons of NOx credits purchased by Ontario Hydro (now Ontario Power Generation Inc.) from the Detroit Edison Munroe (power) Plant near Detroit;
- NOx credits created by Ontario Hydro through early installation of low-NOx burners in its fossil-fuelled generating station at Nanticoke;
- NOx credits sold by Ontario Hydro to two Connecticut utilities to allow those utilities to meet their obligations under a State of Connecticut directive (approximately 500 U.S. tons).

Ontario Power Generation provides a case in point on the value of reduction trading in the face of unexpected setbacks. It has voluntarily agreed to cap NOx emissions at no more than 38 kilotonnes annually in the year 2000 and subsequent years, but as a result of difficulties with its nuclear stations, emissions have increased, amounting in 1998, to 55.8 kilotonnes (as NO). OPGI has been installing low NOx burners in its coal stations to reduce NOx emissions.

"Ontario Power Generation and its predecessor Ontario Hydro, has a long standing history of working together with government, industry and the community in the development of solutions and policies that are economically and environmentally sustainable. As such, Ontario Power Generation realized the value in the Anti-Smog Action Plan partnership and the approach being taken to achieve improved air quality in Ontario. Ontario Power Generation fully supports this approach and will continue in its efforts to do its fair share to address air quality issues through its partnership with ASAP members."

Bob Kozopas
Senior Advisor
Environmental Affairs, Ontario Power Generation

7.0 U.S.-Ontario transboundary smog reduction initiatives

Ontario's Advocacy Role: More than 50 per cent of Ontario's smog problem originates from emitters of nitrogen oxides (NOx) and volatile organic compounds in the United States.

Reduction of transboundary pollution is being encouraged and advocated through cooperative, mutually beneficial activities with the U.S. This year, Ontario stepped up its efforts and is taking an advocacy role to protect the province's air, environment and health interests. In February 1999, the U.S. Court of Appeals granted Ontario intervener status, allowing the province to appear in court to support the U.S. Environmental Protection Agency's order requiring 22 states plus the District of Columbia to submit State Implementation Plans (a process under the Clean Air Act known as a SIP Call). The SIP Call (Sept. 24, 1998) set caps for states to limit their NOx emissions and required 22 states and the District of Columbia to submit SIPs by Sept. 30, 1999. The rule requires that emission reduction measures be in place by May 1, 2003, and that caps be met by 2007. This rule would reduce emissions in the United States and reduce transboundary pollution into Ontario. The Plans will show how to reduce transboundary air pollution by May 2003. The EPA rule, intended to reduce U.S. ground level ozone and emissions of NOx, is being challenged by a coalition that includes Michigan, Ohio, Indiana, five other states and major polluters such as power and coal mining companies. Ontario filed its brief on July 16, 1999, in support of the EPA. In March 2000, the U.S. Court of Appeals ruled in favour of the EPA.

Canada-United States Air Quality Agreement:

The original Canada-U.S. Air Quality Agreement was signed in March 1991 to address transboundary air issues. Initially, the focus was on acid rain, and this focus has now been extended to the transboundary and international issues of smog transport.

Resolution of transboundary air quality issues usually requires action at the federal level, as the federal government has traditionally been responsible for reducing transboundary pollution. A number of bilateral agreements are in place between Canada and the U.S. such as the Canada-U.S. Air Quality Agreement (AQA) and the Canada-U.S. Great Lakes Water Quality Agreement.

A more recent AQA, signed April 7, 1997, provides for the development of a *Joint Plan of Action for Addressing Transboundary Air Pollution*, which is the first step toward negotiating new annexes on ground-level ozone and particulate matter in the atmosphere. Canada is co-operating with the U.S. in a transboundary ozone management pilot project, known as the Regional Ozone Study Area (ROSA), under this agreement.

Canada-U.S. Air Quality Agreement:
ozone annex

Energy and environment ministers agreed in October 1998 that Canada should explore the development of an ozone annex to the Canada-U.S. Air Quality Agreement. The Ontario Ministry of the Environment has been invited to represent the other provinces to advise the Canadian government as part of the Canadian negotiating team for developing the annex.

U.S. initiatives will also benefit Ontario in the longer term. The State Implementation Plans (noted above) and the backstop strategy of a proposed Federal Implementation Plan (should the 22 states not submit their SIPs) are expected to benefit Ontario's air quality. As well, a model NOx Budget Trading Program, included in the SIP Call, will allow states to achieve over 90 per cent of the required emissions reductions in a highly cost-effective manner.

Ontario's ability to participate in the U.S. "cap-and-trade" scheme will likely require an investment in implementing its own cap levels and trading provisions similar to those implemented by the U.S. Work in this direction has already been under way with the PERT initiative.

Ontario's strategy to reduce transboundary pollution includes continuing to look to the federal government for leadership in pursuing emission reductions with the U.S.:

- Co-operating with the federal government by providing advice to the Canada/U.S. Air Quality Committee, and providing technical expert support;
- Monitoring the U.S. for opportunities for co-ordination;
- Influencing the U.S. position through contacts and visits; and,
- Playing an advocacy role to support the U.S. EPA in its efforts to reduce transboundary pollution.

8.0 Monitoring performance and measuring progress

The 1998 Smog Plan said...

To co-ordinate activities, enhance communications and track progress, a management system will be put in place for Ontario's Smog Plan. It will include a framework for monitoring performance and measuring progress. [It] will identify the ways in which performance and progress can be measured (measures of health, ambient air quality, emissions reductions, process targets, etc.) and the level of detail needed.

It is of paramount importance to the success of the Anti-Smog Action Plan that the Plan's partners are able to accurately and objectively measure and credibly report on progress in emission reductions. The task of developing performance indicators for measuring and reporting on success was assigned to the Performance Monitoring and Reporting Work Group, which reports to the ASAP Operating Committee. The work group is a multi-stakeholder group with representatives from the private sector, non-government organizations and the federal and provincial governments.

The work group prepared ***A Draft Progress Report by the Performance Monitoring and Reporting Work Group under the Ontario Smog Plan, May 1998***, proposing a number of performance indicators for scientifically sound, reputable and quantifiable measurement tools to track, measure or otherwise assess:

- domestic emissions of nitrogen oxides and volatile organic compounds, the primary ozone-producing precursors;
- domestic emissions of inhalable and respirable particulates (IP/RP), a major component of smog;
- the transboundary transport of smog, ground-level ozone and their precursors from the United States into Ontario;
- the human health and environmental effects of ground-level ozone and smog in Ontario;
- the degree of broad involvement of public and private sector participation in the Plan; and,
- ultimately, any reduction in the incidence of ground-level ozone concentrations that exceed provincial air quality criteria.

The intent of performance indicators is to show objectively over the years how air quality in Ontario has been affected and improved by various actions taken by the signatories of the Anti-Smog Action Plan.

Process for identifying performance indicators

A number of criteria were used to screen the potential list of indicators: Indicators should be necessary, scientifically valid, interpreted in terms of a desired outcome, readily available at a reasonable cost, timely, integrative and broadly applicable.

After this progress report by the Performance Monitoring and Reporting Work Group is adopted by the Operating Committee, the work group expects that each sectoral and issue-based work group will track appropriate performance indicators as part of the development and implementation of their reduction plans.

9.0 Anti-Smog Action Plan progress summary

The Anti-Smog Action Plan process has focused on the organization of work groups, the identification and documentation of work in progress, quick starts, actual emission reductions and long-term plans. Some work groups are in the early stages of formation while other groups are in advanced stages of action affecting smog reductions. Owing to the constraints identified in this report, no attempt has been made to quantify Ontario's total emissions reductions at this time.

This report lays out areas in which considerable progress has been made in both strengthening the foundation for the Plan's implementation and in terms of actual emission reductions. Its intent is to provide an accountability framework for participants who have entered into voluntary agreements with the government. The progress assessment's findings:

In the area of emission reductions:

- Calculating accurate emission reductions is proving complex. Without a set of consistent protocols, partners are reporting emissions inventories based on varying parameters and assumptions. Focus needs to be placed on the Performance Monitoring Work Group's efforts toward the implementation of a disciplined management policy. Further progress reports will need to provide a comprehensive science-based analysis of emissions and emission reductions.
- In the area of particulate matter, while the federal government has initiated strategic options processes, these will need to move forward more rapidly with industry's support if targets are to be confirmed and met.
- In the area of public engagement, there are strong signs of broader community awareness in light of Drive Clean. Activity by environmental non-government organizations (ENGOs) remains high in terms of broadening public awareness. However, the energy and resources placed on this initiative as a result of the smog plan itself are minimal. Improved integration between ASAP and other clean-air initiatives is needed.
- The Partnership agreed in its initial plan that the issues of level playing field, incentives and rewards need to be addressed for the plan to work. With the exception of the Pilot Emission Reduction Trading Project, an industry-led activity resulting directly from the smog plan, these areas still need considerable attention. The ongoing involvement of the Ministry of the Environment as an overseer of Emission Reduction Tracking (ERT) is essential to its success.

Report 1998 – Environmental Commissioner of Ontario

Recommendation 12

MOE should develop programs to reduce smog-causing pollutants from area sources and industrial emissions, update its regulatory standards for air contaminants, and allocate sufficient human and financial resources to ensure rigorous enforcement of all air pollution regulations and standards.

More work is needed in some areas

- The Plan's priority focus for this reporting period was on developing Ontario's readiness to reduce particulate matter emissions, on public engagement and environmental monitoring and reporting. The following sectors, groups or agencies could provide an integrated function with the Ontario Smog Accord for more effective and efficient reduction of smog precursors and overall improvement to Ontario's air quality.
    - Transportation Demand Management
    - Off-road Vehicles
    - Heavy Equipment Surface Coating
    - Pesticide Formulation
    - Pulp and Paper
    - Natural Oil Extraction
    - Wood Treatment
    - Rubber Treatment
    - Asphalt (solid)

These areas should be examined in the next phase of the Anti-Smog Action Plan.

In the area of planning

- The Plan's partnership has yet to engage its broader constituencies. While key players from the major sectors are engaged in the process and committed to action, and other sectors are coming on board, the level of awareness in individual company members of these sector-based associations remains relatively low.
- The Operating Committee has identified the need for continued strengthening of the planning process. A number of Memorandums of Understanding are being negotiated, and giving priority to their completion would provide a strong indication of partners' commitment to the Plan.

In the area of reporting:

- The success of this Plan can be measured only by the achievement of specified goals and objectives. While the foundation for planning and implementation has significantly improved, the voluntary reporting process is becoming increasingly complex. In the light of the numerous players in the ASAP Partnership, as noted earlier, there are inconsistencies in data collection and reporting methodologies; data gaps in sectors; unconfirmed baseline information; complex categorization and re-categorization of sectors and sub-sectors. It is important that methods are implemented quickly which enable accurate reporting on emissions reductions.

Reporting requirements for all electric power generation companies and their facilities in Ontario's electricity sector to report annually on their emissions of oxides of nitrogen (NOx), sulphur dioxide (SO2) and a variety of other substances of concern such as mercury and carbon dioxide (CO2) were announced on January 24, 2000. These requirements are intended to take place in May 2000.

[Note: starting January 1, 2001, the Ontario government will begin to require reporting of emissions for all companies and organizations in Ontario's commercial, industrial, private and public sectors.]

- The Particulate Matter and Ozone Options Assessment Working Group is examining additional data that will be needed to ensure participants that ASAP programs and emission reduction strategies are developed and prioritized on the basis of quality data, sound science and fairness while ensuring solution flexibility and harmonization with other jurisdictions. At a minimum, such data should include: emission sources; annual emissions, current production and emission control technologies; alternative cleaner production processes; alternative more effective and lower cost emission control technologies; and the capital and annual operating costs of emission reduction.

In the area of U.S.-Ontario transboundary air pollution

- More than 50 per cent of the pollutants that cause Ontario's smog and acid rain come from sources in the United States. Ontario should continue pressing the U.S. to reduce emissions and, in doing so, continue the commitment to meeting or exceeding U.S. Environmental Protection Agency standards. Taken as a system, Ontario's electricity sector is already cleaner than those in the U.S. because Ontario relies less on coal and more on nuclear and hydraulic generation.

10. Literature cited

1. *Towards a Smog Plan for Ontario*, June 1996, Government of Ontario.
2. *Ontario's Smog Plan, A Partnership for Collective Action: Steering Committee Report*, January 1998. Ontario Ministry of the Environment and the Ontario Smog Plan Steering Committee.
3. *Ontario's Smog Plan: Draft 1997 Work Group Reports Compendium Document*. Government of Ontario.
4. *Strategic Options to Address the Fine Particulate Matter Issue in Ontario*, March 1999. Ontario Ministry of the Environment for the Ontario Smog Plan Steering Committee.
5. *A Compendium of Current Knowledge on Fine Particulate Matter in Ontario*, March 1999. Ontario Ministry of the Environment for the Ontario Smog Plan Steering Committee.
6. *Information Gaps and Uncertainties in the IP/RP Compendium Document and their Impact on Strategic Options*, August 1999. Centre for Research in Earth and Space Technology and Network for Environmental Risk Assessment and Management.
7. *Science Assessment Document on Particulate Matter*, 1999. Federal-Provincial Working Group on Air Quality Objectives (available at http://www.hc-sc.gc.ca/ehp/ehd/catalogue/bch.htm).
8. *Science Assessment Document on Ozone*, Draft March 1999. Federal-Provincial Working Group on Air Quality Objectives.
9. *Smog Plan Steering Committee Perspectives on the Development of Fine Particulate Matter Standards from the May, 13, 1999 Meetings at Queen's Park, Toronto, Ontario, October 22, 1999*. Ontario Ministry of the Environment and the Ontario Smog Plan Steering Committee.
10. *Smog Alert: A Municipal Response Guide*, May 1999. Ontario Ministry of the Environment.
11. *Environmental Best Practice Manual for Benzene Emissions*, 1998. Canadian Steel Producers Association.
12. *New Source Performance Standards and Guidelines for the Reduction of Volatile Organic Compound Emissions from Canadian Automotive OEM Coating Facilities*. Canadian Council of Ministers of the Environment (CCME), August 1995.
13. *National Standards for the VOC Content of Canadian Commercial/ Industrial Surface Coating Products - Automotive Refinishing*. CCME, October 1998.

14. *National Standards and Guidelines for the Reduction of VOCs from Canadian Commercial/Industrial Surface Coatings - Automotive Refinishing*, CCME October 1998.
15. CCME *Environmental Code of Practice for the Reduction of Volatile Organic Compound Emissions from the Commercial/Industrial Printing Industry*, August 1999.
16. *Assessment of the Environmental Impact of VOC Solvent Emissions from Windshields and the potential reduction in VOC Solvent Emissions from the use of Windshield Washer Fluid*. CANTOX Environmental Inc., Draft Report, 1999
17. *A Direction for Change: Charting a Course for Competitive Electricity and Jobs in Ontario*, November 1997. Government of Ontario White Paper.
18. *Atomospheric Emissions From Stationary Combustion Turbines*, 1994. Ontario Ministry of the Environment.
19. CCME *National Emission Guideline for Commercial/Industrial Boilers and Heaters*, 1998.
20. *A Guide to Combustion Efficiency and Reduced Emissions* (in progress). Ministry of the Environment, Union Gas, Enbridge Consumers Gas and NRCanada.
21. *Proposed Performance Indicators for Ontario's Anti-Smog Action Plan; A progress report developed by the Performance Monitoring and Reporting Work Group (PMRWG)*, January 2000. Ontario Ministry of the Environment and the Ontario Smog Plan Steering Committee.
22. *Open Doors 1998: Ontario's Environmental Bill of Rights*, 1998. Environmental Commissioner of Ontario.
23. *Strategic Options for the Management of Toxic Substances from the Base Metals Smelting Sector*, June 23, 1997. Report on Stakeholder Consultations, Canadian Environmental Protection Act.
24. *Strategic Options for the Management of Toxic Substances from the Iron and Steel Sector*, December 1996. Report on Stakholder Consultations, Canadian Environmental Protection Act.
25. *Framework for the Application of Socio-Economic Analyses in Setting Environmental Standards*, CCME Canada Wide Standards Economic Integration Task Group, last located at http://www.ccme.ca/pdfs/SEFrameENG.pdf.

11. Glossary of abbreviations

AAQC	ambient air quality criterion
AQA	Air Quality Agreement
AQMAs	Air Quality Management Areas
ARWETO	Association of Registered Wood Energy Technicians of Ontario
ASAP-OC	Anti-Smog Action Plan Operating Committee
BACTEA	Best Available Control Technology Economically Achievable
CCME	Canadian Council of Ministers of the Environment
CCPA	Canadian Chemical Producers Association
CIPEC	Canadian Industrial Program for Energy Conservation
CMHC	Canada Mortgage and Housing Corporation
CO	carbon monoxide
CPCA	Canadian Portland Cement Association
CPCA	Canadian Paint and Coatings Association
CPPI	Canadian Petroleum Products Institute
CRESTech	The Centre for Research in Earth and Space Technology
CSPA	Canadian Steel Producers Association
CVMA	Canadian Vehicle Manufacturers' Association
CWS	Canada-Wide Standards
EBR	Environmental Bill of Rights
ENGO	environmental non-government organization
EPA	Environmental Protection Agency
IP/RP	Inhalable and respirable particles
kT	kilotonnes (1,000 metric tons)
kWh	kilowatt hour
MM BTU	million British thermal units
LDAR	Lead Detection and Repair

LOC	Letter of Cooperation
LOU	Letter of Understanding
MOE	Ministry of the Environment
MOU	Memorandum of Understanding
NERAM	Network for Environmental Risk Assessment and Management
NH_3	Ammonia
NOx	nitrogen oxides (as NO, NO_2 = 1.53 NO)
NRCan	Natural Resources Canada
O_2	oxygen
O_3	ozone
OAWG	Options Assessment Working Group
OBD-II	on-board diagnostic systems
OEM	original equipment manufacturer
ONGA	Ontario Natural Gas Association
OPGI	Ontario Power Generation Inc.
OPS	Ontario Public Service
PAH	polyaromatic hydrocarbons
PERT	Pilot Emission Reduction Trading
PM	particulate matter
ppb	parts per billion
ROSA	Regional Ozone Study Area
SIP	State Implementation Plan
SOR	Strategic Options Report
SOx	sulphur oxides
SULEVs	super ultra low-level emissions vehicles
TEA	Toronto Environmental Alliance
TSP	total suspended particles
ug/m	micrograms per cubic metre
VOCs	volatile organic compounds

Ontario

Appendix I:

Anti-Smog Action Plan Questionnaire

Ministry of the Environment
135 St. Clair Avenue West
Toronto ON M4V 1P5

Ministère de l'Environnement
135, avenue St. Clair ouest
Toronto ON M4V 1P5

Air Policy and Climate Change Branch
135 St. Clair Avenue West, 4th Floor
Toronto, Ontario, M4V 1P5

March 1, 1999

To: Member Signatories to Ontario's Smog Accord,
Ontario Smog Plan Steering Committee Members &
Ontario Smog Plan Work Group Co-chairs

RE: Progress on Ontario's Smog Plan

Since mid-1996, we have taken part in a broad-based partnership of government, business, academia, environmental and community groups in developing Ontario's Smog Plan. The Plan was released in January 1998 and many companies and organizations have joined the partnership and signed the Smog Plan Accord.

We have now entered the assessment phase for the first year of the Smog Plan Activities and I would like to review the progress made and new initiatives developed by Ontario's Accord Signatories and other members to reduce smog precursors. As you are aware, we have already identified opportunities to take us halfway to the proposed 45% NOx and VOC emission reduction target. These reductions are a result of industries, government and non-government organizations working together.

Measuring actions and results of smog emission reduction activities and success stories will allow us to more accurately inventory and track our smog reduction progress. I have therefore attached a short questionnaire that we would like to have completed and returned to the Secretariat, Ontario's Smog Plan. We will be assembling the data and preparing a draft progress report for review with the Smog Plan Steering Committee.

Please return the questionnaire to Mr. John Newdick, Secretariat, Ontario's Smog Plan, Ministry of the Environment, by FAX: (416) 314-4128 or mail to 135 St. Clair Ave. West 4th Floor. Toronto, ON M4V 1P5 by March 26, 1999.

If you need any further information or clarification on the questionnaire, please don't hesitate to contact Walter Chan at (416) 327-6419.

Yours sincerely,

original signed by
Tony Rockingham
Chair, Ontario Smog Plan Steering Committee

Attachments

Ontario's Smog Plan Questionnaire: NOx and VOC Reductions of the Smog Accord and Smog Plan Steering Committee Members

March 1999

Ontario Ministry of the Environment
Air Policy and Climate Change Branch
135 St. Clair Avenue West, 4th Floor
Toronto, Ontario, M4V 1P5

Ontario's Smog Plan Questionnaire: NOx and VOC Emissions

The purpose of the following questions is for the documentation of non-regulatory actions being used to reduce smog and report on progress with the Ontario Smog Plan.

A Draft Progress Report will be presented to the Smog Plan Steering Committee based on the results of the questionnaire.

Instruction for Completing Questionnaires:

- Please complete the attached survey to reflect any reductions in NOx, and VOC emissions and related activities that have been achieved to date.
- The questionnaire has been designed generically and is suited for either individual company use or summaries from an entire sector or sub-sector of industry. Please provide summary information as specified by individual company, sub-sector or sector.
- Please indicate whether the information you are providing results from estimations or measured data. Estimated data would be based upon process input/output information or computer model calculations while measured data would result from the efforts of monitoring, analytical sampling and chemical analysis, etc.
- Return completed questionnaires by **March 26, 1999** to:

  Mr. John Newdick,
  Secretariat, Ontario's Smog Plan,
  Ministry of the Environment
  135 St. Clair Ave. West 4th Floor
  Toronto, ON M4V 1P5
  Tel: (416) 314-7878 Fax: (416) 314-4128

Ontario's Smog Plan Questionnaire: NOx and VOC Emissions Reduction

Part I: Background Information

1. Name of Company, Signatory or Work Group

____

b. Contact Person ______________________________

Telephone ______________________________

Fax ______________________________

E-mail ______________________________

c. Address ______________________________

City /Province ______________________________

Postal Code ______________________________

d. Industry Sector ______________________________

Sub-sector ______________________________

e. Please attach list of company names represented on this survey (see Part IV).

Part II: Participant Status

Please indicate ☑ the nature of your participation in the Smog Plan:

☐ Has your company/sector signed the Smog Accord? If not, are you willing to sign it now?

Please provide updates for the 1990 baseline data inventory (or other baseline year, please indicate):

☐ NOx ____________________ kT (year)
☐ VOCs ____________________ kT (year)
☐ PM_{10} ____________________ kT (year)

☐ Have "Quick Starts" been identified and implemented?
Please describe:

☐ Have short term targets been identified and implemented (to year 2000)?
Please describe:

☐ Long-term Emission Reduction Plan in place to year 2015
Please describe or attach and include data in Part III

☐ Letter Of Intent, Letter Of Commitment or Memorandum Of Understanding completed with the Ministry.

Please describe ______________________________________

Part III

Smog Plan Questionnaire

Summary of NOx, VOC and PM$_{10}$ Emissions and Reductions

Emissions & Reductions	NOx Emissions[2] kT/yr Measured (M) Estimated (E)	NOx Reductions3 kT/yr Measured (M) Estimated (E) Regulatory(R) Voluntary (V)	VOC Emissions[2] kT/yr Measured (M) Estimated (E)	VOC Reductions[3] kT/yr Measured (M) Estimated (E) Regulatory(R) Voluntary (V)	Particulate Matter Emissions[2] (PM$_{10}$) kT/yr Measured (M) Estimated (E)	Particulate Matter Reductions[3] (PM$_{10}$) kT/yr Measured (M) Estimated (E) Regulatory(R) Voluntary (V)
Date[1]						
1998	________	________	________	________	________	________
2000	________	________	________	________	________	________
2005	________	________	________	________	________	________
2010	________	________	________	________	________	________
2015	________	________	________	________	________	________

Notes:

1. Use data from other year if appropriate.
2. Please indicate whether the information that you are providing results from estimations or measured data. Estimated (E) data would be based upon process input/output information or computer model calculations while Measured (M) data would result from the efforts of monitoring, analytical sampling and chemical analysis, etc. Place appropriate letter (E) or (M) with value i.e 14kT(M)(R).
3. Reductions relevant to baseline year (i.e. 1990 or other year). Please indicate whether the emission reductions result from Regulatory (R) or Voluntary (V) activities.

Part IV:

Companies Surveyed:

Appendix 2: Summary of Ontario's Anti-Smog Action Plan Progress: Identified Potential NOx and VOC Reductions as of March 1999

Sector	**Nitrogen Oxides (NOx) kilotonnes/yr**	**Volatile Organic Compounds (VOCs) kilotonnes/yr**	**Target Year**
Clean Vehicle Technology & Fuel Improvements	65-80*	80-97*	2000
-Alternative Fuels	6	3.2	2015
Drive Clean	17	45	2005
Transportation Demand Management	0.3-10*	0.3-10*	2015
Iron and Steel Manufacturing	2	0.4	1996
	1.5	0.6	2001
Ontario Power Generation**	19	n/a	2000
NOx Emissions			
- Boilers / Heaters	29	n/a	2015
- Gas Turbines	29	n/a	2015
- Cement Kilns	1.5	n/a	1998
- Copper/ Nickel Production	43	n/a	1995
Petroleum Refining Sector			
- Stage I Vapour Recovery	n/a	19	1998
- Leak Detection & Repair/Tank Control	n/a	10	1998
Chemical Manufacturing	4.2	11.1	1998
Surface Coatings			
- Automobile refinishing	n/a	3	ns
- Automobile manufacturing	n/a	16.5	1998
- General Metal	n/a	0.1	1998
- Can Coating	n/a	0.5	1998
General Solvent Use			
- Consumer Coatings	n/a	3.8	1995
- Plastic Processing	n/a	0.3	1997
- Adhesives and Sealants	n/a	1.6	1995
- Wood Treatment	n/a	0.6	2015
- Rubber Products	n/a	1.2	2015
Consumer Products	n/a	5	ns
Total Emissions Reductions (kilotonnes/yr)	217-242	202-228	
1990 baseline emissions (kilotonnes/yr)	659	868	

* range of potential emissions reductions. n/a = not applicable, ns = not specified

** [illegible]

Appendix 3: Anti-Smog Accord Signatories - January 2000

Adhesive and Sealant Manufacturers' Association of Canada

Algoma Steel Inc.*

Altech Group, The

Atlas Specialty Steels*

Automotive Industries Association of Canada

Automotive Parts Manufacturers' Association

Ball Packaging Products Canada Inc.

Blue Circle Cement

Canadian Boiler Society

Canadian Chemical Producers' Association*

Canadian Farm & Industrial Equipment Institute

Canadian General Tower Ltd.

Canadian Manufacturers of Chemical Specialties Association

Canadian Paint and Coatings Association

Canadian Petroleum Products Institute

Canadian Plastics Industry Association

Canadian Portland Cement Association, Ontario Region

ChemCraft International Limited

Collision Industry Action Group

Consumers' Association of Canada

Co-Steel LASCO*

Crop Protection Institute of Canada

Crown, Corke & Seal Canada

Dofasco Inc.*

Fabricated Plastics Limited

Falconbridge Limited

Gerdau Courtice Steel*

Hamilton District Autobody Repair Association

Hilton Works, Stelco Inc.

Inco Limited

John Deere Welland Works

Lafarge Canada Inc., Bath Cement Plant

Lafarge Canada Inc. Cement Group, Woodstock Plant

Lake Erie Steel Company Ltd.*

Lambton Industrial Society*

Ontario Ministry of the Environment

Motorcycle and Moped Industry Council

Ontario Federation of Anglers and Hunters

Ontario Greenhouse Vegetable Growers

Ontario Power Generation Inc.

Ontario Marina Operators Association

Ontario Natural Gas Association*

Private Motor Truck Council of Canada

ProtectAir Inc.

Quebecor Printing Canada

Regional Municipality of Hamilton-Wentworth

Shorewood Packaging

Slater Steels – Hamilton Specialty Bar Division*

St. Lawrence Cement, Mississauga

Stelco Inc.*

Waterfront Regeneration Trust

---

* Support the Anti-Smog Accord with exceptions or clarifications, or expressed the need to review supporting documents.

ISBN 0-7778-9493-9
PIBS 3952E
© Queen's Printer for Ontario, 2000

Printed on 100% recycled paper
including 75% post consumer fibre